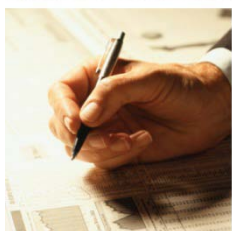




# Montgomery County, Maryland Commercial Building Energy Efficiency Policy Study

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March 2013

## **Montgomery County, Maryland Commercial Building Energy Efficiency Policy Study Acknowledgements**

### **Study Consultants**

M.C. Furman Associates (MCFA) served as the lead consultant for the project that included the Study. ICF International (ICF) conducted the Study as part of the MCFA consulting team. ICF was selected to lead the Study for its expertise in commercial building technologies and markets and its analytical tools, data sources and program experience. This includes deep experience in commercial building energy efficiency and potential analysis: ICF has, for example, conducted efficiency potentials studies for BGE and Pepco, two of Maryland's largest utilities.

Additionally, ICF supports the U.S. Department of Energy's State and Local Energy Efficiency Action (SEE Action) Network working group for existing commercial buildings, in which capacity the firm has developed similar kinds of policy and program solutions the County is considering in this Study. Moreover, ICF has supported U.S. EPA's ENERGY STAR® Buildings program for many years, including the Portfolio Manager software tool used for energy performance benchmarking.

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# Executive Summary

The Montgomery County Department of Environmental Protection (DEP) commissioned this Commercial Building Energy Efficiency Policy Study (referred to hereinafter as the “Study”) to assess commercial and multifamily buildings across the County and develop options for achieving reductions in energy consumption across the community’s commercial and multifamily sectors.

Several forces drove the need for the Study:

- Growing concerns about the environmental impacts of energy use, especially on air pollutant and greenhouse gas emissions. The County’s 2009 **Climate Protection Plan** noted that commercial and multifamily buildings account for more than a third of the County’s energy and carbon footprint. The Plan includes a specific energy savings goal of 25% over 10 years for the commercial sector with the need to make measureable ongoing progress towards this goal.
- Desire to help building owners and managers reduce their energy bills in a time of rising energy costs. This need was a driver behind the 2008 **EmPOWER Maryland** legislation, which targets a 15% per-capita reduction in electricity use by 2015. Local governments like the County can use the utility-run EmPOWER programs as leverage to help achieve local goals.
- Need to identify the types of commercial buildings in the County and the energy efficiency measures and solutions applicable to helping property owners and managers find site specific solutions.
- The key role that energy efficiency can play as a clean-energy economic recovery and jobs creation strategy. The **2009 American Recovery and Reinvestment Act (ARRA)** included a County grant of over \$7.6 million. The funds were used for a variety of retrofits in public buildings, commercial and multifamily projects, training of building operators, development of education and outreach platforms, and the retrofit of nearly 1,000 single family homes.

In response to these driving forces, the County seeks to identify high-impact, nimble policy and program options that reduce energy consumption while boosting job creation and economic competitiveness and enhancing community health.

## Goals of the Study

The Study’s goals are to:

- Better understand the County’s commercial and multifamily building stock and how it would be affected by various energy efficiency policies;
- Explore the key barriers that limit private-sector investment in energy efficiency;
- Project the technical potential for reaching the Climate Protection Plan’s goal of reducing commercial and multifamily sector energy use by 25% over ten years;
- Develop a set of policy and program options that show the greatest promise for attaining the 25% goal;

- Engage a wide range of stakeholders to gain their insights and recommendations for prioritizing, shaping, and implementing County policy and program options.

## Components and Methods of the Study

The Study is comprised of four main elements:

- Commercial and multifamily building stock characterization
- Energy Efficiency potential modeling analysis
- Potential policy options
- Stakeholder outreach and feedback

The methods used in these Study elements are summarized in the subsections that follow.

### 1. Commercial/Multifamily Building Stock Characterization

In order to build a realistic baseline for the modeling analysis ICF developed a detailed assessment of the County's commercial and multifamily buildings. ICF utilized the County's property tax database, the commercial CoStar real estate data service, and other sources to develop building counts, square footage estimates, and energy usage characteristics for a variety of different building types.

### 2. Energy Efficiency Potential Modeling Analysis

ICF used its Energy Efficiency Planning Model, a rigorous analytic tool employed by utilities and governments for detailed energy efficiency planning and related analysis, to develop projections of the technical potential for energy savings in the County's commercial and multifamily buildings.<sup>1</sup> Additionally, ICF utilized the Maryland state utility baseline study, the County's energy tax database, and other sources to develop well-grounded energy savings projections.

### 3. Potential Policy Options

ICF conducted an analysis of relevant recent local government energy efficiency policies and programs around the country to supplement the modeling analysis and develop options for the County to consider. The 2,300+ localities that received grants similar to the County's ARRA grant provided rich sources of experience, as did the Department of Energy's State and Local Energy Efficiency Action Network (SEE Action). ICF developed detailed information on ten policy categories, some involving regulation and some based on voluntary incentive approaches. ICF also examined portfolio possibilities that the County could develop as a suite of policies that would complement one another, maximizing savings potential while minimizing regulatory burdens.

### 4. Stakeholder Outreach and Feedback

The Study contacted more than 240 stakeholders, mostly commercial or multifamily building owners and managers but also associations, advocacy groups, financial institutions, energy service providers, government employees, and utilities. 88 people participated in the Study's

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<sup>1</sup> ICF uses the Energy Efficiency Planning Model for utility clients' program planning analyses, including Pepco, BGE, and Dominion Virginia Power.

online survey and provided detailed information on their views on proposed policies as well as additional information on the workings of the County’s markets for energy efficiency in these sectors. Additionally, ICF conducted in-depth follow-up interviews with 33 stakeholders representing a similar distribution of types, through a combination of telephone conversations, in-person interviews, and group discussions. After the draft report was issued, a public forum was held, and written comments were invited. They are included in Appendix C.

## Key Findings

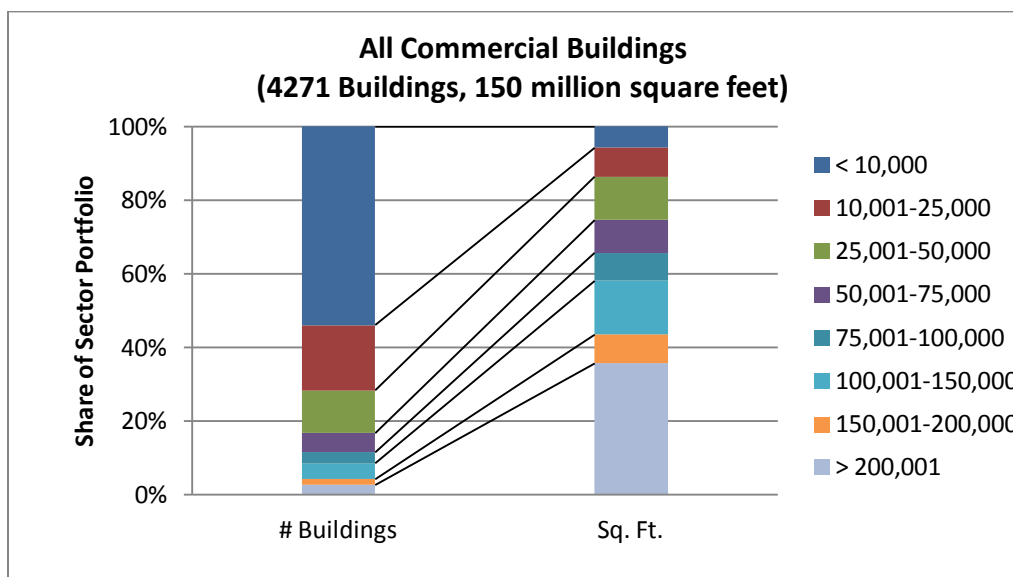
Highlights of the Study’s findings are presented below, organized by the Study’s four main elements.

### 1. Commercial/Multifamily Building Stock Characterization

The extensive data produced in this component of the study could be summarized in the following points:

- **The “80-20” rule applies.** For most building types, the great majority of the stock is found in a relatively small number of larger buildings. This suggests that County policies could productively focus on the largest buildings, especially for regulatory policies, thus exempting the great majority of building owners from any added regulation. Figure ES-1 illustrates this trend.

**Figure ES-1. Distribution of Commercial Floor Space by Building Size**



- **Commercial and multifamily market segments present different challenges.** The County will need to carefully consider targeting its policies and programs to gain the greatest energy savings, while also addressing the barriers and needs unique to each market segment. The Study found that both commercial and multifamily markets exhibit

characteristics that must be accounted for in policy and program design if they are to be successful.

- **Commercial buildings such as offices, retail, and healthcare differ greatly from each other in terms of energy systems, operating patterns, ownership patterns, and financing structures.** The Study team quantified information on nine commercial building types, which make up the great majority of the total building stock, and found 11 categories of multifamily building, each with its unique aspects regarding energy systems, utility metering, ownership and governance, and financing.

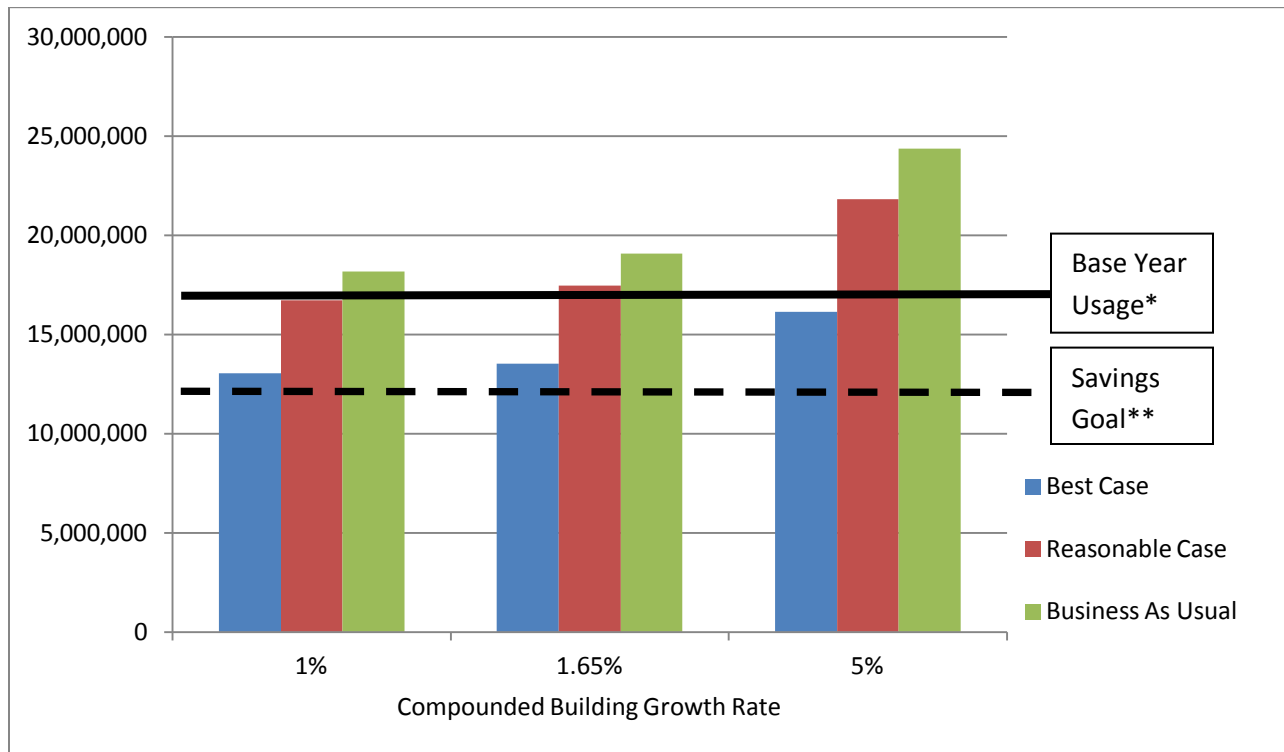
## 2. Energy Efficiency Potential Modeling Analysis

The modeling analysis produced extensive data on potential energy savings, focused solely on what is technically feasible. A technical potential study does not consider cost-effectiveness, market barriers, or other implementation issues that limit the ability to realize savings in real markets. On a technical potential basis, the analysis found that there are enough energy savings to reach the County's goal, with several "ifs": if funds are easily available, if markets worked perfectly, and if new buildings are very energy-efficient, such that total energy demand growth stays low.

Figure ES-2 summarizes the technical potential analysis for commercial and multifamily buildings. This figure shows the savings potential under three building growth rate assumptions. The middle set of bars in each graph are based on the County's 20-year average growth rate (1.65%); the left and right set of bars represent low (1%/year) and high (5%/year) growth assumptions about total energy use over ten years.

The left (blue) vertical bar in each group of three represents an aggressive ("best") case, in which every existing building installs every possible efficiency measure, and codes for new construction are 45% more stringent than at present, thus ensuring that future energy growth in new construction is low. The middle (red) bar in each group is a moderate ("reasonable") case in which existing buildings realize only 30% of technical savings potential, and energy codes are 15% more stringent than current codes. The right (green) bar in each group is a low ("business as usual") case, in which existing buildings realize less than 1% of the technical savings potential, and energy codes do not change from current levels.

**Figure ES-2. Commercial and Multifamily Residential Buildings Technical Energy Efficiency Potential under Three Building Stock Growth Assumptions (Total Site Million Btu)**



\*Base year usage is derived from a composite of county, state and federal sources from the 2009-2011 period.

\*\*The savings goal is 25% reduction from the base year usage

The solid horizontal line represents total base year energy usage, and the dashed horizontal line represents the 25% savings goal. The left-most (blue) vertical bars in each graph, demonstrate that total energy usage after 10 years comes close to the 25% goal. However, realizing these savings would require very aggressive energy codes, low total growth in square footage, and 100% installation of every feasible efficiency measure in all existing buildings.

Figure ES-2 includes combined technical potential estimates from both commercial and multifamily buildings. However, as the full report shows, multifamily buildings hold greater technical potential than commercial buildings, both in total energy percent savings terms. They tend to be older, are more subject to market barriers, and are harder to finance for energy retrofits. It is apparent that to achieve the County's 25% goal, even on a technical basis, multifamily buildings would have to be a key part of any County policy and program suite.

### ***Policy/Program Scenario Analysis***

The modeling effort also sought to project savings from a variety of different policies and programs. The Study's goal was to assess which portions of the total technical potential might be achievable based on different policy and program designs. This analysis, however, is more

limited in accuracy than the technical potential analysis, due in part to limited data on the measured impacts of such policies, and in part due to the limitations of modeling techniques in accurately estimating specific impacts of a given policy. Therefore, these policy scenario analyses are necessarily based on a number of assumptions, and thus should be viewed as indicative for comparative purposes, and not as predictive in any hard-number sense. For these reasons, ICF does not present an aggregate projection of all the policies combined. Figure ES-3 compares midrange estimates of energy savings impacts for a sample of the policy types evaluated in this Study.

**ES-3. Comparison of Mid-Range Potential Policy Impacts**

<b>Policy Category</b>	<b>Potential Savings</b>	<b>Assumptions</b>
Mandatory RCx/Audits	5%	10% average savings per building
Max Building Codes	5%	45% more stringent than current code; 1.7% growth scenario
Mandatory Retrofits	4%	Lighting measures only: interior, exterior, including parking lots
Mandatory Benchmarking	2%	5% average savings per building
Community Challenge	2%	33% of office space participates, savings average 20%/building
Financing/Tax Credits	0.50%	County efforts cause 25% increase in utility program impacts

Figure ES-3 should not be used to project hard estimates of the impacts of specific policies, but it does indicate that certain policies can help achieve significant portions of the 25% goal. These results suggest that some of these policies are worth pursuing, but no one policy is capable of delivering the savings needed to come close to the County's 25% savings goal. A suite of policies, designed to complement each other, is necessary to approach this goal.

### ***Cost-Effectiveness Considerations***

The focus of this Study is on the technical potential for energy efficiency savings. However, economic considerations play an important role in the policy development process. For this Study, one challenge is to define which cost-effectiveness test perspective is the most appropriate given the goals of the Study. In a utility setting, the Maryland Public Service Commission, like many other state regulators, has well-established economic tests it applies to utility programs. However, this Study is not focused primarily on utility programs, which have somewhat different goals. Given the focus on building owners and occupants, ICF chose a participant perspective as the most reflective of an individual building owner and occupant's view of the market. Accordingly, ICF applied the Participant Cost Test (PCT) to yield a preliminary assessment of the cost-effectiveness of the measures considered in the potential study. The results of the analysis are shown in Figures ES-4 and ES-5.

**Figure ES-4. Costs and Benefits for Aggregate Efficiency Measures  
(Full Installed Cost Basis)**

<b>Commercial Buildings</b>			
<b>Discount Rate</b>	<b>Full Installed Costs (\$M)</b>	<b>Lifetime Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$7,497	\$697	0.09
7.50%	\$7,497	\$599	0.08
10%	\$7,497	\$522	0.07

<b>Multifamily Buildings</b>			
<b>Discount Rate</b>	<b>Full Installed Cost (\$M)</b>	<b>Lifetime Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$1,180	\$562	0.48
7.50%	\$1,180	\$469	0.40
10%	\$1,180	\$398	0.34

\*Savings over the life of the measure, discounted to present value

\*\*A score of 1.0 or greater indicates cost-effectiveness over the lifetime of the measure

**Figure ES-5. Costs and Benefits for Aggregate Efficiency Measures  
(Incremental Cost Basis)**

<b>Commercial Buildings</b>			
<b>Discount Rate</b>	<b>Incremental Costs (\$M)</b>	<b>Value of Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$297	\$428	1.38
7.50%	\$297	\$373	1.21
10%	\$297	\$329	1.07

<b>Multifamily Buildings</b>			
<b>Discount Rate</b>	<b>Incremental Costs (\$M)</b>	<b>Value of Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$285	\$335	1.18
7.50%	\$285	\$282	0.99
10%	\$285	\$242	0.85

\*Savings over the life of the measure, discounted to present value

\*\*A score of 1.0 or greater indicates cost-effectiveness over the lifetime of the measure

These figures show that achieving full technical potential would cost nearly \$9 billion if all measures were installed at once, and at full cost. This raises a key difference between these two figures: ES-4 is based on the full installed cost of the measures, while ES-5 is based on incremental costs. Incremental costs represent the additional cost to install an efficient equipment model over the cost of a standard equipment model. On an incremental-cost basis, total costs fall to under \$700 million. As the figures show, fully installed costs can be four to 25 times greater than incremental costs. This disparity between full and incremental costs tends to favor policies and programs that focus on building upgrades that can be justified on an incremental-cost basis.

These figures also show that as a group, the measures that make up full technical potential are cost-effective only on an incremental-cost basis, and at low discount rates. Market barriers, as discussed elsewhere in this report, can severely limit the ability to achieve a high fraction of efficiency potential. Policy and program action is thus typically required to drive markets toward accelerated and broader adoption of efficiency technologies and practices.

While the Study was not design to calculate the economic and environmental impacts of these policies, the project team made some rough estimates of job creation and air pollutant/greenhouse gas emission reduction potential.

- **Job Creation.** Investing in energy efficiency can contribute to stable, long-term economic growth and encourage job creation at an estimated rate of five to 15 green jobs per \$1 million invested.
- **Avoided Emissions.** Reductions in energy use create environmental benefits in the form of reduced air pollutant and greenhouse gas emissions, both from buildings' onsite combustion equipment and from utility power plants. For example, every megawatt-hour (MWH) avoided prevents the emission of 1,300 pounds of carbon dioxide (CO<sub>2</sub>), equivalent to nearly seven pounds of acid rain and smog-forming pollutants such as nitrogen oxides and sulfur dioxide.

As the County considers specific policy and program actions, economic and environmental impacts will require more detailed assessments.

### **3. Potential Policy Options**

The ten policies and program types described in this Study align with two broad categories: those that drive demand for energy efficiency through increased energy use awareness and upgrade requirements and those that enable investment in energy efficiency through financial and procedural mechanisms. The policies and programs are listed by category below and discussed in more detail in the pages that follow. This list is not meant to be exhaustive; the County may consider other options not evaluated in this Study.

#### **Driving Demand for Energy Efficiency**

1. Community Energy Challenge
2. Energy Performance Benchmarking and Disclosure
3. Energy Assessment and Retro-Commissioning (RCx)

4. Building Energy Codes (*new construction and major renovation only*)
5. Building Energy Retrofit Requirements

#### **Enabling Investment in Energy Efficiency**

6. Energy Efficiency/Green Building Tax Credits
7. Property-Assessed Clean Energy Financing
8. On-Bill Financing
9. Energy-Efficient/Green Leasing
10. Energy Efficiency Rebate and Grant Programs

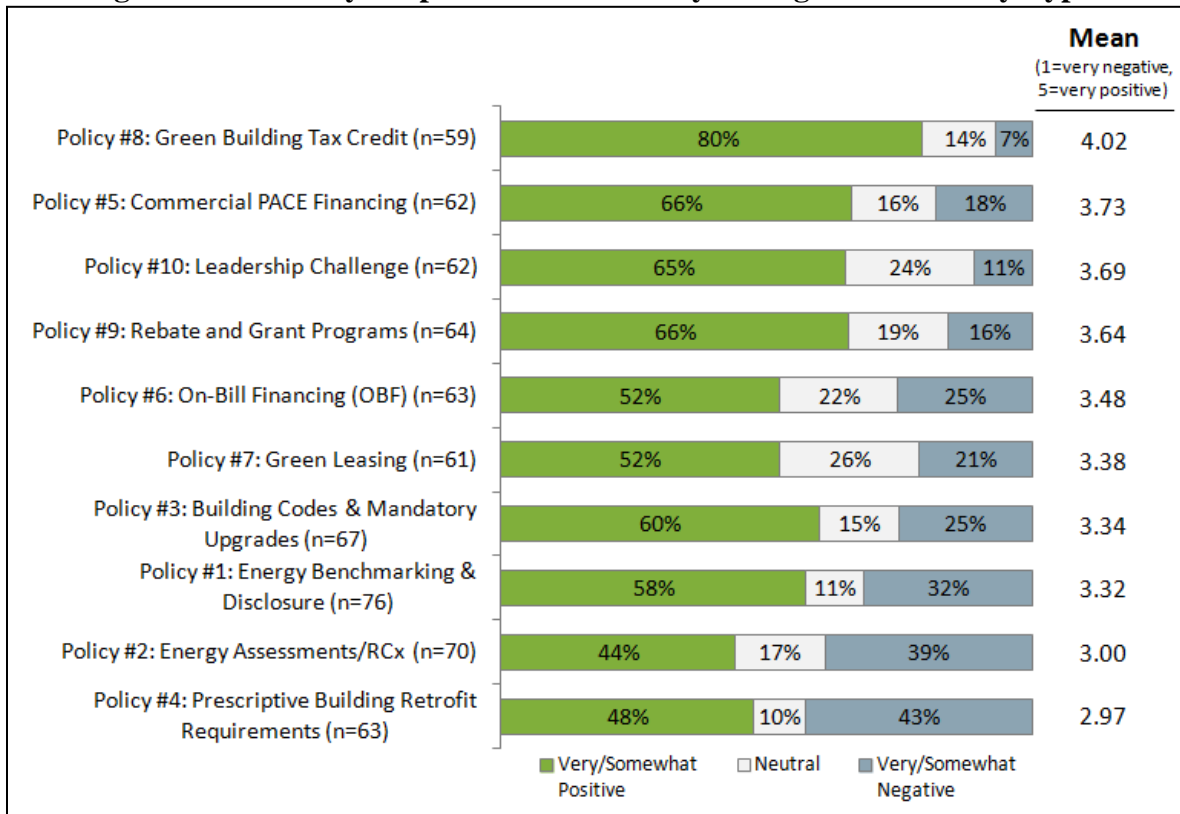
While each of the policies and programs in this report are described individually and therefore could be viewed as standalone policy options, combining or linking policies in a broader portfolio is also recommended in certain situations. For example, the first program discussed—a Community Energy Challenge—can provide an umbrella for other voluntary and mandatory initiatives.

The potential and policy scenario analyses described in this Study support the idea of a portfolio approach. No one program or policy is a “silver bullet” solution that can meet the savings goal by itself. Rather, efficiency policies might better be viewed as a set of “silver BBs” that collectively can make a significant difference. Moreover, comparing a single policy like benchmarking to an umbrella approach like a community challenge shows that the umbrella approach can offer greater savings potential over time.

#### **4. Stakeholder Outreach and Feedback**

The survey effort produced a quantified set of views of the ten policies that were evaluated by ICF in this Study. The views of the key set of stakeholders who provided input for the Study are summarized in Figure ES-6. Note that the total numbers of respondents was not large enough to assign statistical significance to these numbers. As with some other analytical elements in the Study, these results should be viewed as indicative rather than conclusive.

**Figure ES-6. Survey Respondent Favorability Ratings on Ten Policy Types**



The figure shows that voluntary incentive programs are the most popular among stakeholders. Only two policies failed to receive “positive” or “somewhat positive” ratings from a majority of respondents: mandatory retro-commissioning (RCx)/energy audits, and mandatory prescriptive building retrofits. The survey also provided additional detail on respondent’s experience with data collection and reporting, financing, and incentive programs in the marketplace.

To help the County to prioritize policy and program options, findings on stakeholder feedback and energy savings potential are combined in Figure ES-7. Policies with both higher favorability ratings and higher energy savings potential appear in the lower right cell of the table; higher-favorability and lower energy savings potential policies are in the upper right cell, and so on.

The only policy type that shows high energy savings potential as well as high stakeholder favorability is building energy codes. No policy scores lower on both favorability and energy savings, leaving most policy approaches in the two mixed-score categories. This suggests the County will need to carefully balance stakeholder support with energy savings potential in considering policies for implementation, as few policies enjoy both broad support and high energy savings potential.

**Figure ES-7. Policies Grouped by Stakeholder Favorability and Potential Energy Savings**

<b>Potential Energy Savings</b>	<b>Stakeholder Favorability</b>	
	Lower ( <i>mean score <math>\leq 3.0</math>; most respondents tend to view unfavorably</i> )	Higher ( <i>mean score <math>&gt; 3.0</math>; most respondents tend to view favorably</i> )
Lower ( <i>savings potential <math>\leq 3\%</math> of baseline usage</i> )		<ul style="list-style-type: none"> <li>• Financing/incentives (policies 5, 6, 7, 8, 9)</li> <li>• Mandatory benchmarking</li> <li>• Community challenges</li> </ul>
Higher ( <i>savings potential <math>&gt; 3\%</math> of baseline usage</i> )	<ul style="list-style-type: none"> <li>• Mandatory RCx/audits</li> <li>• Mandatory lighting retrofits</li> </ul>	<ul style="list-style-type: none"> <li>• Mandatory energy codes for new buildings</li> </ul>

## Conclusions and Recommendations

Focusing the findings on the County’s goal to identify the best policy and program solutions for achieving the 2009 Climate Protection Plan’s 25% energy use reduction by 2020, ICF draws the following conclusions:

- **Reaching the energy savings goal will be difficult.** ICF’s analysis shows that the technical potential exists to achieve the 25% goal in 10 years. However, this technical potential assumes a perfect world in which neither economics nor market barriers constrain investment; it assumes every energy-using device is instantly replaced with the most-efficient model available. Therefore, reaching the County’s goal would require technical approaches that are not in general practice, as well as a very aggressive set of policies and programs.
- **Policies and program solutions can make substantial progress toward the goal.** While no one policy or program reviewed in this Study can meet the savings goal by itself, several showed the potential to attain significant energy savings. This is consistent with energy efficiency policy studies performed around the country, in which there is no one “silver bullet” solution, but a suite of “silver BBs” or “silver buckshot” policies.
- **Stakeholders favor voluntary approaches on balance.** While some mandatory policies, such as building energy codes, received favorable stakeholder ratings, the balance of stakeholder input supports voluntary over mandatory approaches. The County should seek to carefully balance these policy and program approaches in considering its options going forward.
- **EmPOWER Maryland programs offer significant leverage.** Utility ratepayer-funded programs available to the County’s commercial and multifamily building owners align well with several of the policy and program options evaluated in this Study, including retro-commissioning, benchmarking, and financial incentives. Given the County’s limited funding options in the post-ARRA environment and the current fiscal climate, utility-administered programs represent the largest single source of partnership for the County’s efforts going forward.

These conclusions lead ICF to the following recommendations for the County:

- **Develop a suite of policies based on a “voluntary with backstop” approach.** Because utility programs currently offer retro-commissioning and benchmarking services as well as rebates for efficient technologies, the County could leverage these programs through a community challenge approach. The County could challenge larger building owners to commit to voluntary energy savings targets, including benchmarking their buildings, and set quantitative targets for participation and energy savings for a defined time period. If enough of the market voluntarily participated and reached these targets, the County could waive mandatory benchmarking and retro-commissioning regulations. If the targets were not met by the end of the defined time period, regulations would take effect on a pre-established date.

Within this overall recommendation, the following corollary recommendations apply:

- **Focus on larger buildings.** 50,000 square foot buildings or larger represent 75% of commercial floor space in the County. The County can reach 75% of the market while impacting only one in six buildings.
- **Focus carefully on multifamily buildings.** Although this is a difficult to reach segment because of the wide diversity of build types and ownership patterns, these buildings hold a great deal of the total energy savings potential. Multifamily markets require special emphasis, including tailoring program technologies, incentives, and outreach efforts to meet the specific needs of multifamily owners (of both buildings and individual units), managers, owners associations, and tenants and their associations.
- **Focus on the most cost-effective avenues.** Policies and programs should be designed to target the most cost-effective opportunities in the commercial and multifamily markets, including time of construction, time of equipment replacement, time of refinancing or resale, or major renovation.
- **Leverage existing resources.** The current EmPOWER Maryland utility programs are the principal source of incentives and technical resources for helping commercial and multifamily buildings achieve the County’s energy savings goals. The County Green Business Certification program is a framework in which the County should launch the community challenge approach. Energy services providers can also be sources of expertise that the County can leverage to help launch and sustain its policy and program initiatives.
- **Provide implementation support from County Staff.** This initiative will require momentum driven from the County and adequate staffing. While leveraging outside resources is important, experience in Washington, D.C. and other local governments makes it clear that some staffing is needed to ensure that new initiatives move forward and succeed. Even if only one significant policy is implemented, at least one additional full-time staff position would likely be needed to make the effort succeed; multiple policies and programs would likely increase total staffing and related resource needs.

# 1.0 Background

The Study was conducted against a backdrop of unprecedented levels of federal, state, and local focus on energy efficiency policy activity. A closer examination of this landscape provides numerous lessons for the County to draw upon. Several driving forces, outlined below, spurred the development of this Study:

- The County's 2009 **Climate Protection Plan** found that one-third of the County's carbon emissions are attributed to commercial buildings. The Plan accordingly includes a specific energy savings goal for the commercial sector: reducing total energy use by 25% over 10 years.
- Public policy goals aimed at helping energy users manage their energy bills in a time of rising energy costs. The 2008 **EmPOWER Maryland** legislation calls for a 15% per-capita reduction in electricity use by 2015. While the main focus of attaining EmPOWER goals rests with electric utilities, local governments like the County can use the EmPOWER programs as leverage to help achieve local goals, in partnership with utilities and the Maryland Public Service Commission.
- The recent focus on energy efficiency as a clean-energy economic recovery and jobs creation strategy. The federal **American Recovery and Reinvestment Act (ARRA)** appropriated about \$12 billion for state and local government energy efficiency, including \$3.2 billion spent in the Energy Efficiency and Conservation Block Grant program (EECBG). The County received a direct EECBG grant of approximately \$7.6 million, which was spent on improving County facility energy efficiency, grants to small businesses and multifamily buildings, residential energy retrofits, and this Study. While ARRA funding expires in 2012, it leaves a legacy of increased awareness of the potential benefits of energy efficiency, and has motivated many local governments to pursue policies and programs toward that end. In the County's case, it commissioned this Study to begin charting a course toward realizing its energy savings goal in the commercial sector.

These forces shaped the Study's goals to better understand the County's commercial and multifamily building stock and markets, assess the technical potential for meeting the Climate Protection Plan goal of saving 25% of commercial energy use, identify and evaluate policy and program options for realizing the technical potential, and engage stakeholders in the process to gain their insights and viewpoints.

On the federal level, EECBG and other ARRA grants programs spurred many state and local governments to examine the kinds of programs and policies the County is evaluating in this Study. The U.S. EPA ENERGY STAR® Buildings program has successfully benchmarked approximately 20% of the nation's building stock using the Portfolio Manager software, and has encouraged many state and local governments to pursue policies requiring benchmarking of building energy performance. The U.S. Department of Energy State and Local Energy Efficiency Action Network (SEE Action) includes an Existing Commercial Buildings Working Group, which has developed several policy and program solutions the County could consider.

These publicly-funded initiatives are more than matched by an extensive web of private and nonprofit efforts, from the Clinton Climate Initiative to the International Council of Local

Environmental Initiatives (ICLEI). The Study conducted a review of the trends in local government energy efficiency policy action that emerge from the initiatives listed above, and from consulting a range of other sources. This review reveals that local governments have become substantially more active in energy efficiency policies and programs.

The most common categories of policy action have been in the following areas:

- **Benchmarking and disclosure.** Several cities and states (as detailed in Section 3.2) are implementing policies that require commercial building owners to benchmark the energy performance of their buildings and publicly disclose summary data.
- **Audit/retro-commissioning.** Several local governments (as detailed in Section 3.3) have established requirements for buildings of a certain size and type to conduct energy audits/assessments, and/or to “retro-commission” buildings, which involves tuning up energy systems to run more efficiently.
- **Building codes.** The ARRA State Energy Program (SEP) grant rules require all states to adopt building energy codes based on the 2009 International Energy Conservation Code (IECC), and to establish plans for attaining 90% or better compliance with codes within eight years. Montgomery County’s energy code is governed by Maryland law, and so the County is subject to this requirement; the County has already adopted IECC 2012 (as detailed in Section 3.4)
- **Financing.** Policymakers recognize that paying for energy efficiency improvements often requires funding beyond the immediate means of some building owners. Many ARRA grantees have thus focused substantial attention on creating workable financing options, both to help building owners make upgrades, and to develop sustainable funding methods that will carry their efficiency strategies beyond the expiration of ARRA grants (Sections 3.7 to 3.9 describe three principal types of financing frequently considered by local governments in recent years).
- **Utility programs.** More than half of the states, covering about two-thirds of U.S. electricity customers, are implementing policies that require utilities to achieve aggressive energy savings targets. Maryland’s EmPOWER legislation places it among these states. The County’s goal of a 25% absolute reduction in usage over 10 years makes it more aggressive than the EmPOWER goal of a 15% per capita reduction by 2015. Nonetheless, the County has the opportunity to work in partnership with electric and gas utilities to support incentive and technical assistance programs that can help meet the County’s 25% savings goal. Now that ARRA funds are almost fully spent, continuing utility program funding becomes increasingly important in sustaining the momentum of local government efficiency strategies (Section 3.10 provides more information).
- **Community Challenges.** Several local governments, building on their own strategic energy management efforts, have engaged private sector building owners in voluntary leadership challenges designed to recognize outstanding performance and use friendly competition to move the market towards improved energy efficiency (Section 3.1 describes leading examples and additional detail on this topic).

In the Maryland and Greater Washington regional frameworks, the County is part of an active network of state and local government working on energy efficiency. The DEP has made energy efficiency a part of its program and policy efforts for decades, funding a full-time energy planner

position and conducting a range of educational and other initiatives. Using the part of the \$7.6 million in EECBG grant funds that was not spent on improving County facilities, DEP is working with other agencies on numerous activities to reduce energy consumption, create jobs, and expand the market for energy-related services and products. For example, one such effort provided rebates to multifamily communities, businesses, non-profits and congregations for implementing energy improvements. It was intended to “jumpstart” projects by providing a cost-shared rebate complementary to utility incentives for lighting upgrades, heating and cooling upgrades, energy management systems and ENERGY STAR qualified equipment. The County distributed approximately \$1.7 million to approximately 40 projects. The County also partnered with the Building Operations and Management Institute (BOMI) to train facility staff on energy management methods and to provide credentialing and certification for such trainings. A third relevant example is the Green Business Certification program the County created, which has now certified over 33 businesses using measurable sustainability criteria.

In the greater Washington region, other local and state jurisdictions are moving forward with significant energy efficiency policies that provide significant lessons for the County to consider:

- The District of Columbia’s **Green Building Act** in 2006 and the **Clean and Affordable Energy Act** in 2008 created a number of energy efficiency policies, highlights of which are summarized below.
  - **Benchmarking and Disclosure Policy.** The District is in the process of implementing its mandatory energy performance benchmarking and public disclosure policy, which affects District buildings larger than 10,000 square feet and private buildings 50,000 square feet or larger. Public building benchmarking results, which began to be disclosed for fiscal year 2009, showed that District buildings overall were lagging behind national benchmarks in energy performance. Privately-owned building data will begin to be disclosed once the rulemaking is completed. Requirements are being phased in, with buildings 200,000 square feet or larger disclosing first, and buildings at or above 150,000, 100,000, and 50,000 square feet beginning to disclose over a three-year period.
  - **Sustainable Energy Utility (SEU).** The District has become one of a few states that has chosen to administer utility customer energy efficiency programs through a separate, special-purpose entity, instead of through the existing electric and gas distribution utilities. Using funds from a public goods charge on customer utility bills, the SEU provides technical assistance, incentives, and other services to help DC utility customers save energy. It began full operations in 2011.
  - **Building Energy Codes.** The Green Building Act set some of the most stringent commercial building energy codes in the U.S. As of 2010, privately-constructed buildings 50,000 square feet or larger will have to meet U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) new construction standards. The County’s commercial building new construction standards are consistent with the Districts’, and in fact are more stringent. These green building construction standards signal a broader regional “common thread” toward sustainable, low-energy building design.

- Arlington County, Virginia has been active in energy efficiency among other sustainability efforts since the 1990s. Highlights of recent years' initiatives are summarized below.
  - **Benchmarking.** The County began benchmarking government owned and operated facilities in 2000, and by 2007 had expanded the effort to cover almost all its facilities. Using utility tax revenues, performance contracting, ARRA funds, and capital budget allocations, County buildings have reduced total energy use by 8% between 2007 and 2010. Energy performance data for County facilities is disclosed publicly on the County website.
  - **Green Games.** The County challenged major office building owners to join it in setting energy savings targets. Using a voluntary version of energy performance benchmarking, Green Games uses the same basic tools, including the EPA Portfolio Manager software to benchmark performance and track progress against goals. Green Games has engaged about one-third of the County's private office space, about 15 million square feet, with participants choosing savings goals of 10% or 30%.
  - **Building Energy Codes.** The County applies LEED standards to new county-constructed facilities, using an approach similar to the District of Columbia's with the important difference that the County's requirements do not apply to privately-owned buildings.

The **State of Maryland** has its own suite of policy and program activities that contribute to Montgomery County's larger context. The 2008 **EmPOWER Maryland** legislation set energy savings targets for the state, mostly to be achieved through utility-administered programs, but partly through state agency initiatives directly primarily by the Maryland Energy Administration (MEA). The EmPOWER goals are to reduce per-capita electricity use 15% by 2015. EmPOWER utility-funded programs in Montgomery County are administered primarily by Pepco, though BGE and First Energy each have small service areas in the northern and eastern edges of the County. Pepco's commercial programs comprise fixed rebates for common energy efficiency upgrades such as lighting retrofits or HVAC replacements, as well as customized incentives for more complex retrofit projects. Small businesses and multifamily buildings are eligible for special services targeted to their needs. Pepco also offers a range of services to help larger existing buildings improve their energy performance, including retro-commissioning and performance benchmarking, which are two of the approaches the County is considering among its policy and program options. Because the EmPOWER goals are relatively aggressive, Pepco may be receptive to County initiatives that increase program participation and help Pepco meet their energy savings goals. More information on Pepco's commercial program offerings are found at <https://cienergyefficiency.pepco.com/EnergySaveEB.aspx>

## 2.0 Commercial Sector Market Characterization and Efficiency Potential Modeling

### 2.1 Market Characterization and Modeling Baseline

The project team spent considerable time gathering, compiling, and verifying data on the County's commercial building stock and related market characteristics in order to define a relatively accurate baseline for the Study's quantitative assessment of energy savings potential. This helps the County understand the market in greater depth to provide policymakers information that might help in tailoring policies and programs to fit the needs of specific market segments.

ICF drew on numerous sources and applied proven methods to develop baseline commercial buildings market characterization and energy usage:

- **Montgomery County Property Tax Database.** This is a very large database that the County relies on for assessing property taxes. It is useful in determining square footage data, but in some cases the distinctions between building types are not clearly drawn, as the tax assessment process does not require such precision. ICF thus sought to augment the property tax data with other sources.
- **CoStar Database.** This is a private subscription service used by the real estate industry and contains substantial levels of detail. ICF was able to use CoStar data to refine and further disaggregate County property tax data.
- **Maryland Baseline Study.** This study was commissioned by the state so that all utility program planners would be able to access consistent data sources and use common assumptions in planning efficiency programs. This study contains important data on energy technologies and energy intensity levels in existing buildings. The data allowed ICF to characterize existing levels of energy efficiency in the County building stock.
- **County Energy Tax Database.** The County utility tax records include energy sales to residential and non-residential customers. This data helped ICF to calibrate the energy efficiency potential modeling analysis to match actual energy consumption in the County's commercial sector.
- **Mid-Atlantic Technical Reference Manual.** This technical reference provides an established basis for estimating energy savings from energy efficiency measures. It is used by all utilities in the region in planning their customer efficiency programs.
- **New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs.** Like the Mid-Atlantic Manual, this reference provided guidance for estimating savings at the program level rather than at the individual-measure level.
- **Market studies from Previous ICF Demand Side Management (DSM) Analyses.** ICF has conducted energy efficiency program planning studies for both BGE and Pepco in Maryland, as well as for Dominion in Virginia and other utilities around the U.S. While the County Study has a different focus and this is not directly comparable with these utility studies, ICF was able to extract certain kinds of data to better inform the County Study.

## 2.2 Market Characterization Summary

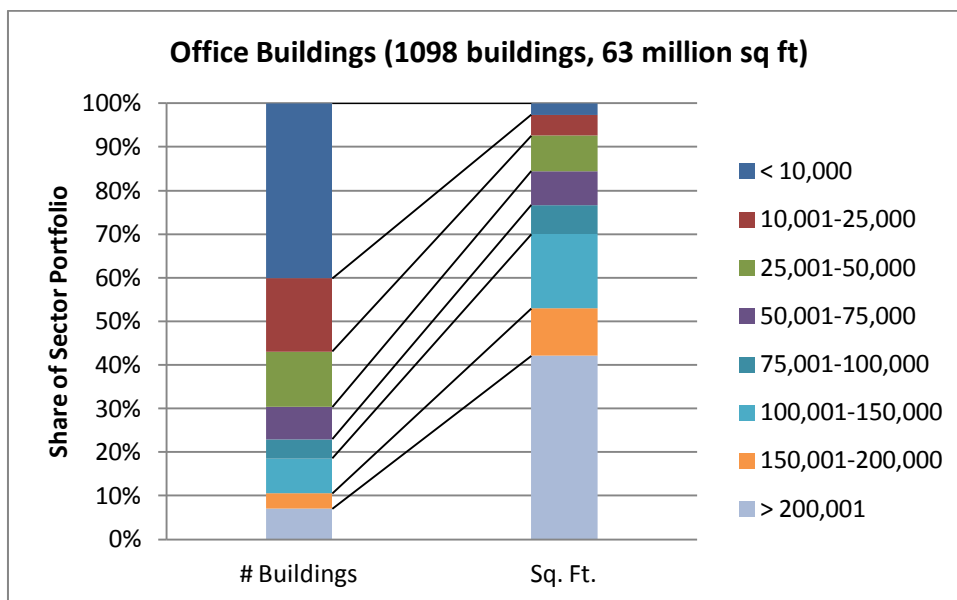
A primary focus of the market characterization task was to identify how many buildings and how much square footage exist within each building type. Given the limitations on data availability, ICF limited detailed characterization to eight building types: Office, Retail, Warehouse, Lodging, Restaurant, Healthcare, Grocery, and Multifamily.

The remaining building types are grouped in a miscellaneous category which includes a wide range of facilities, from parking lots, parks, and recreation areas, to police stations, post offices, and religious buildings.

## 2.3 Commercial Building Stock Characterization

Figures 1 through 7 show the percentage of buildings by size category (left column) and the percentage of square footage by size category (right column). This format shows the percentage of buildings that account for the majority of the square footage in a given building type. For example, in Figure 1 70% of the square footage of office space in the County is contained in buildings of 100,000 square feet or larger, which is less than 20% of the total number of office buildings. The community includes 1,098 office buildings containing over 63 million square feet. Similarly, anecdotal evidence suggests that ownership of larger office buildings is concentrated among a relative small number of owners. This information can help the County target policies and programs more effectively.

**Figure 1. Number of Office Buildings and Square Footage by Size Category<sup>2</sup>**



<sup>2</sup> Note that some of the figure graphics in this section may not display buildings or square footage in certain size categories, though the color legend remains constant across all the figures. This indicates that no buildings in that size category exist in the source data.

Figure 2 illustrates some of the differences between building types. It demonstrates that 70% of retail buildings are under 10,000 square feet, and that to reach 80% or more of floor space the target building size threshold drops to 25,000 square feet.

Figure 2. Number of Retail Buildings and Square Footage by Size Category

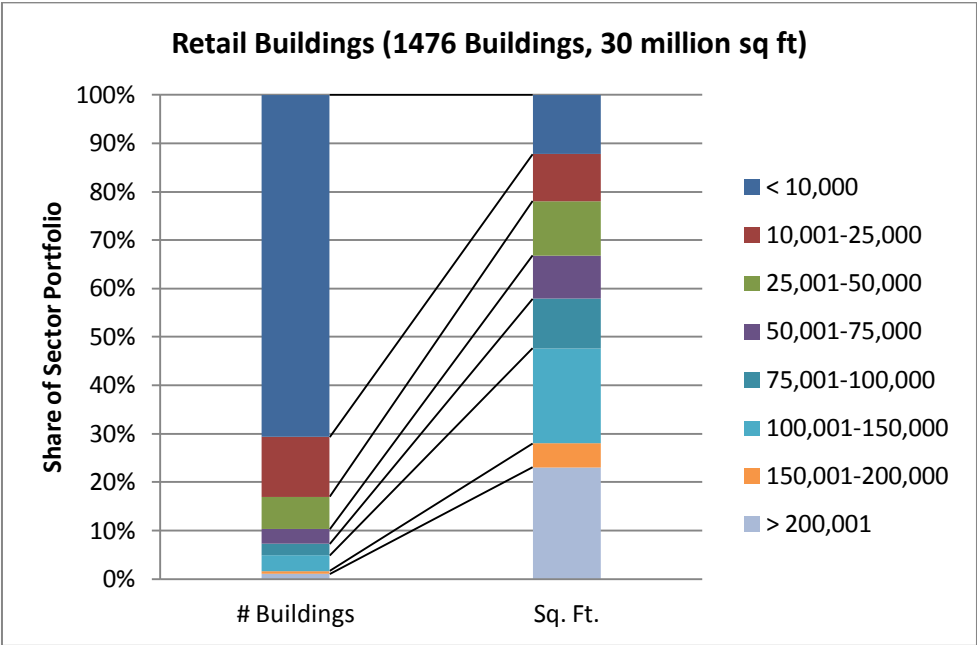
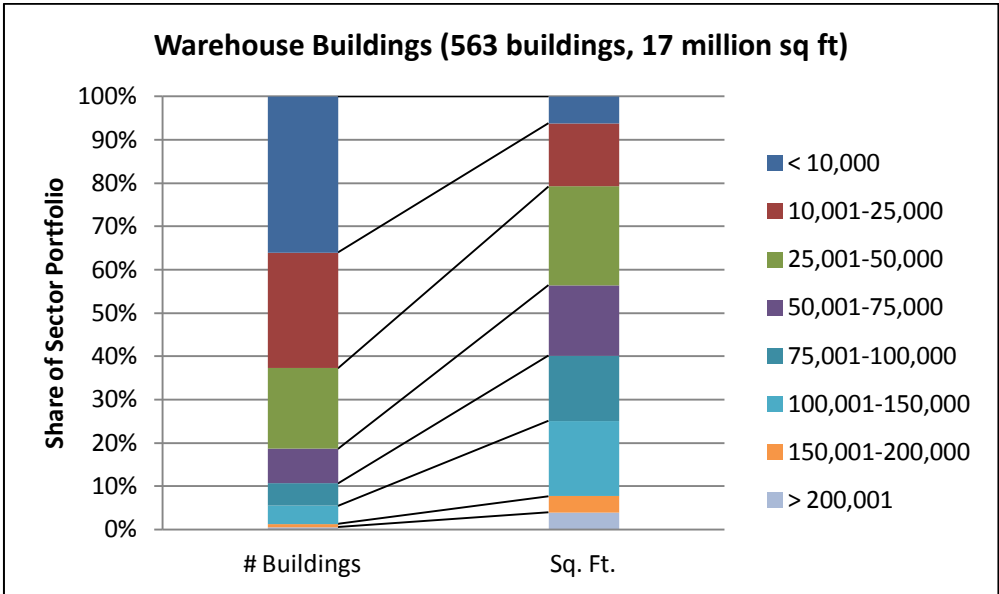


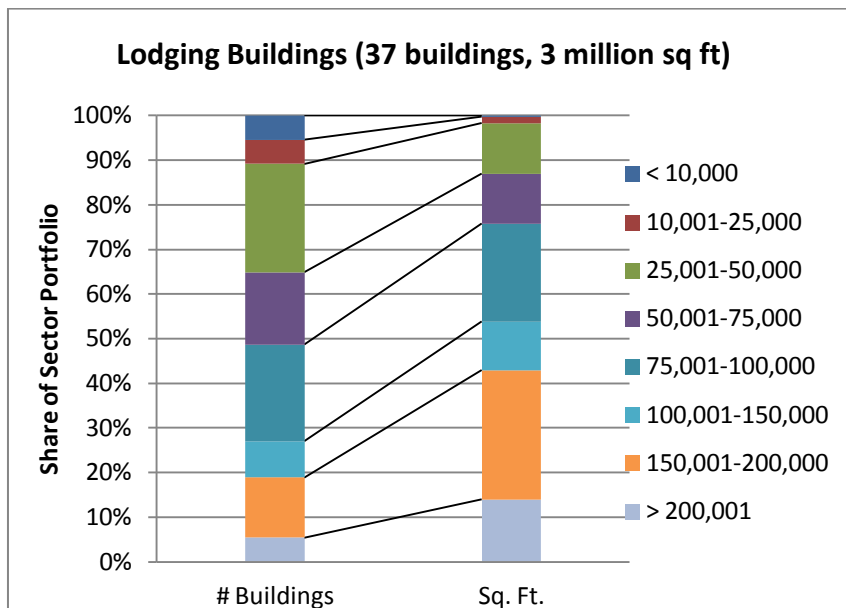
Figure 3 shows warehouses to have a more even distribution of square footage. To reach 80% of floor space, one would have to reach almost 40% of all buildings.

Figure 3. Number of Warehouse Buildings and Square Footage by Size Category



The lodging sector, as shown in Figure 4, also demonstrates a more distributed size range. To reach 80% of hotel/motel floor space, one would have to reach more than 50% of all buildings.

**Figure 4. Number of Lodging Buildings and Square Footage by Size Category**



The health sector, as shown in Figure 5, is comprised of a lot of larger buildings, with about 80% of floor space accounting for 30% of buildings. This building type does not include hospitals, which are all large, and includes a wide range of buildings such as medical offices and physical therapy facilities. The County has six hospitals, averaging 333,000 square feet; these are complex, large facilities, operating 24 hours and seven days per week providing food service, laundry, and other services as well as medical care.

**Figure 5. Number of Health Buildings and Square Footage by Size Category**

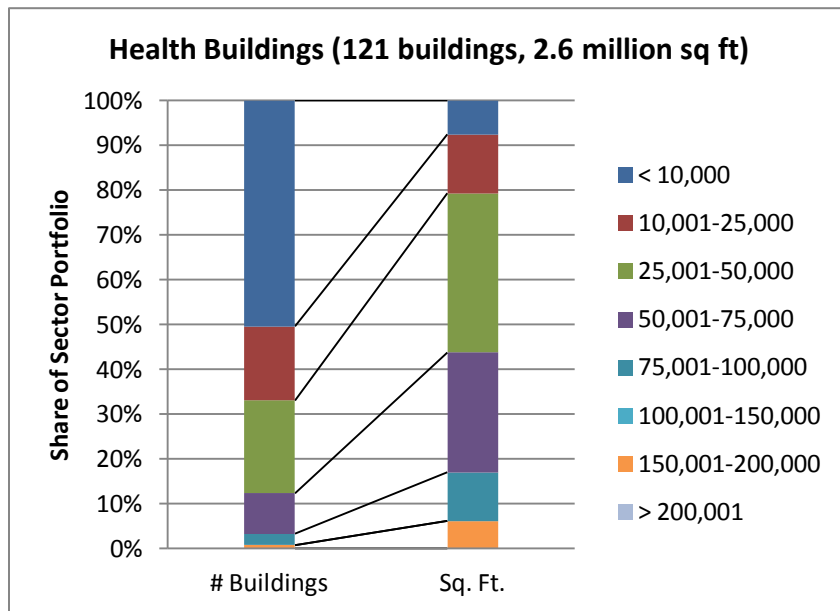


Figure 6 illustrates that most restaurants (about 70%) are less than 10,000 square feet. A few restaurants were reported as over 100,000 square feet which illustrates data issues encountered with the way property records are reported. Further research into the property tax database showed that restaurants reported as over 100,000 square feet were often food courts within large enclosed malls, and that the entire mall area was reported.

**Figure 6. Number of Restaurant Buildings and Square Footage by Size Category**

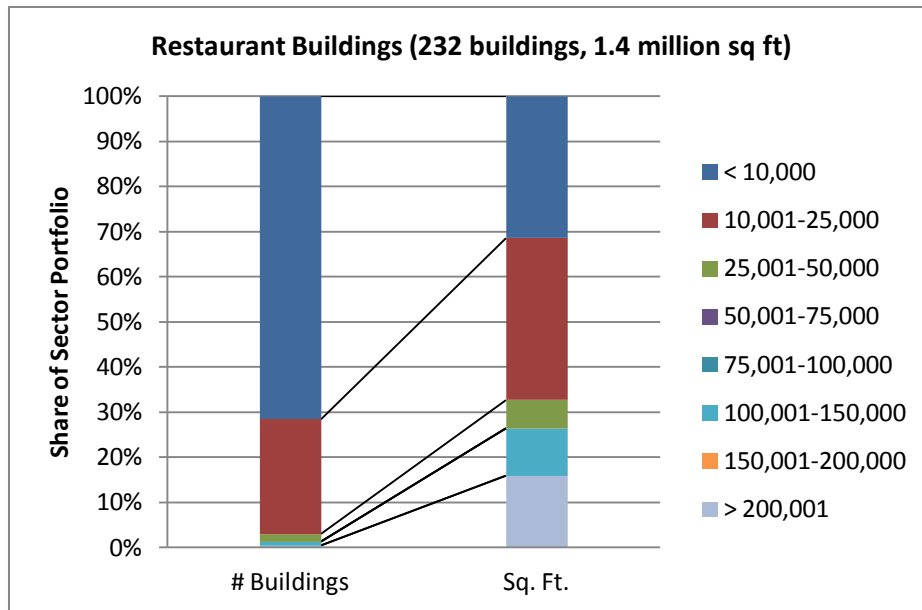
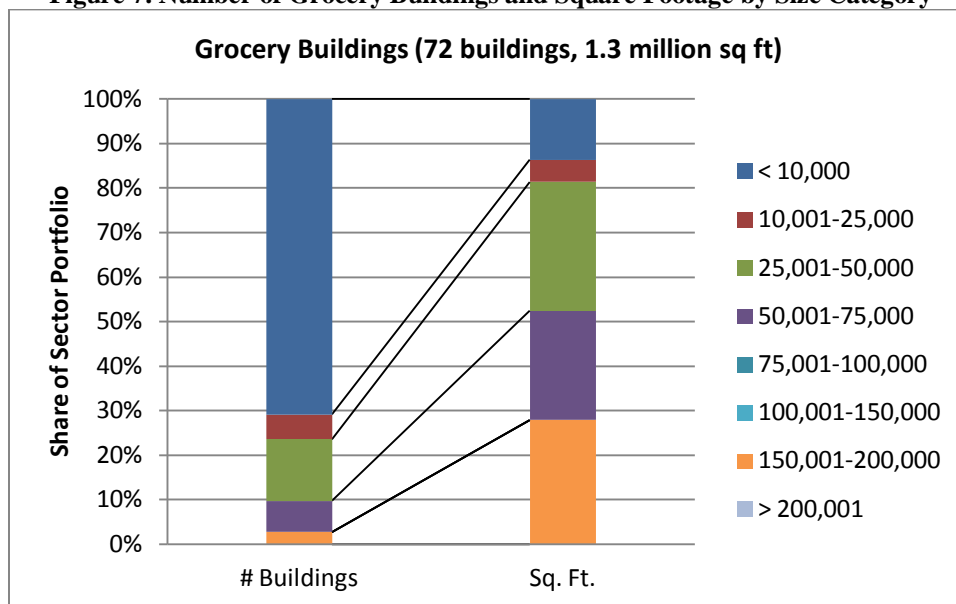


Figure 7 illustrates the distribution of building size in grocery stores. Like the office sector, grocery stores typically have larger building footprints, as approximately 80% of the square footage is contained in about 20% of the buildings.

**Figure 7. Number of Grocery Buildings and Square Footage by Size Category**



## 2.4 Multifamily Building Stock Characterization

The multifamily sector presents a unique set of data challenges, outlined below. For this reason, ICF applied a set of measures used in modeling known to be most effective in multifamily settings.

- **Complex ownership patterns.** There are 14 categories of multifamily housing ownership/usage. If specialty types of buildings such as religious quarters or nursing homes are excluded, there are seven multifamily categories (See Figure 8).
- **Different building configurations and energy systems.** The range of technical issues between high-rise apartment buildings with central heating and cooling, condo units with individual heating and cooling in low-rise designs, and townhouse condos, is extensive.
- **Different utility metering arrangements.** Although it is difficult to get precise data, stakeholder feedback and available data indicates a wide range of metering, from master-metered, all-electric buildings, to buildings master-metered for gas heating and individually-metered for electricity.

Figure 8 below illustrates the challenges ICF encountered in finding and compiling data consistently. The square footage for rental units in the table appears to be under-reported by as much as 90%, as the nominal data indicated unit sizes of 100 to 200 square feet, compared to a county-wide average of about 1,000 square feet. ICF infers that owners may not report all living unit square footage because taxes are paid on the entire building rather than for individual dwelling units. For condos, the units are individually taxed, and so square footage per unit is important for the tax assessment process. ICF also encountered challenges identifying metering types for electricity and gas, and many individually metered properties are not distinguishable as multifamily except by individual inspection of physical addresses.

For example, if the average multifamily dwelling unit is 1,000 square feet, it would suggest that total square footage would be in the range of 127 million square feet. This approaches the total square footage of commercial buildings, which is 150 million square feet. It would thus make the multifamily sector larger than any other non-single-family building sector in the County—about twice the office building sector at 63 million square feet.

**Figure 8. Single-Family and Multifamily Housing Units by Type**  
*(single-family data included in italics for comparative purposes)*

<b>Building Type</b>	<b>Properties</b>	<b>Area (ft<sup>2</sup>)</b>	<b>Housing Units</b>
<i>Single-Family Detached (excludes townhouses)</i>	179,958	587,296,888	179,233
<i>Townhouse, Duplex, Quadruplex, and other forms of attached single-family dwellings (fee simple)</i>	52,789	77,260,035	52,978
Townhouse, Duplex, Quadruplex, etc. (condominium)	349	18,223,516	13,904
Townhouse, Duplex, Quadruplex, etc. (rental)	228	535,951	1,132
Garden apartment (condominium)	189	21,437,558	19,725
Garden Apartment (rental)	660	4,922,393	50,975
High-Rise Apartment Elevator (condominium)	71	19,978,744	17,956
High-Rise Apartment, Elevator (rental)	82	3,825,893	18,044
Cooperative (all types)	100	2,339,852	2,531
Rooming and Boarding Houses	11	25,636	10
Membership Lodgings-Fraternity, Sorority, etc.	2	1,544	1
Retirement Homes and Orphanages	6	135,415	1,019
Religious Quarters	73	244,471	62
Nursing Homes	29	1,167,136	1,954
Mobile Homes (parks or courts)	7	3,468	98
Residence Halls or Dormitories	6	53,846	9
<b>Total Single-Family</b>	<b>232,747</b>	<b>664,556,923</b>	<b>232,211</b>
<b>Total Multi-family</b>	<b>1,813</b>	<b>72,895,423</b>	<b>127,420</b>
<b><u>TOTAL Single-Family and Multifamily</u></b>	<b>234,560</b>	<b>737,452,346</b>	<b>359,631</b>

## 2.5 Commercial Buildings Technical Potential Modeling Methods

This part of the Study was designed to assess the technical potential of achieving the Climate Protection Plan's commercial sector 25% savings goal. ICF applied its Energy Efficiency Planning Model (EEPM) for this purpose. EEPM is a proprietary ICF spreadsheet-based model that is used primarily for utility energy efficiency potential assessments and program plans. ICF uses EEPM for utility clients across the U.S.; in Maryland, ICF has used EEPM to support Public Service Commission (PSC) program filings for Pepco and BGE.

It is important to note that the County Study was designed to serve different goals and examine different questions than would be the subject of a typical utility potential assessment or program

planning analysis. Consequently, information filed with the PSC for Pepco programs is not directly comparable to the approach or the results of the County Study.

The County Study is designed to assess technical potential for energy efficiency, whereas utility analyses examine a much narrower subset of energy efficiency potential. There are three types of efficiency potential that can be assessed using a model like EEPM:

1. **Technical potential** is the maximum savings that could be achieved if every energy-using device was replaced with the most efficient feasible technology, irrespective of time or cost. Technical potential assumes that every energy-using device is replaced within the Study period (10 years), with no constraints imposed by cost or market barriers. It is a “waving of the wand” analysis; technical potential is never experienced in real markets. Technical potential serves mainly to define the outer limits of what is possible with technologies commercially available today.
2. **Economic potential** is the subset of technical potential that is found to be cost-effective. The PSC defines specific cost-effectiveness tests for this purpose; in Maryland, the Total Resource Cost (TRC) is the predominant test applied. TRC compares the present value of savings over the life of the efficiency measure to the costs of installing the measure; if savings exceed costs, the measure is found to be cost-effective.
3. **Achievable potential** is the subset of economic potential that can be achieved in real markets, within a given time period, taking into account market barriers and other market limitations. Utility programs approved by the PSC typically represent achievable potential; under the EmPOWER law, utilities are required to attain specific goals in a specific time period, and program filings thus strive to meet these targets.

Achievable potential is typically a small fraction of technical potential. This should be kept in mind in any attempts to compare the results of this Study with information filed by utilities for their EmPOWER programs. The primary focus of this Study is on technical potential, because the County’s energy savings goal is aggressive and thus requires consideration of full technical potential to bring it within reach. ICF also addresses cost-effectiveness in examination of the costs and benefits of energy efficiency in the County’s building stock. Achievable potential is considered as the Study assesses specific policy and program options, in an attempt to estimate how much of the technical potential could realistically be realized through County efforts. Because this is a policy analysis, economic and achievable potential estimates are less robust than technical potential calculations, as discussed below.

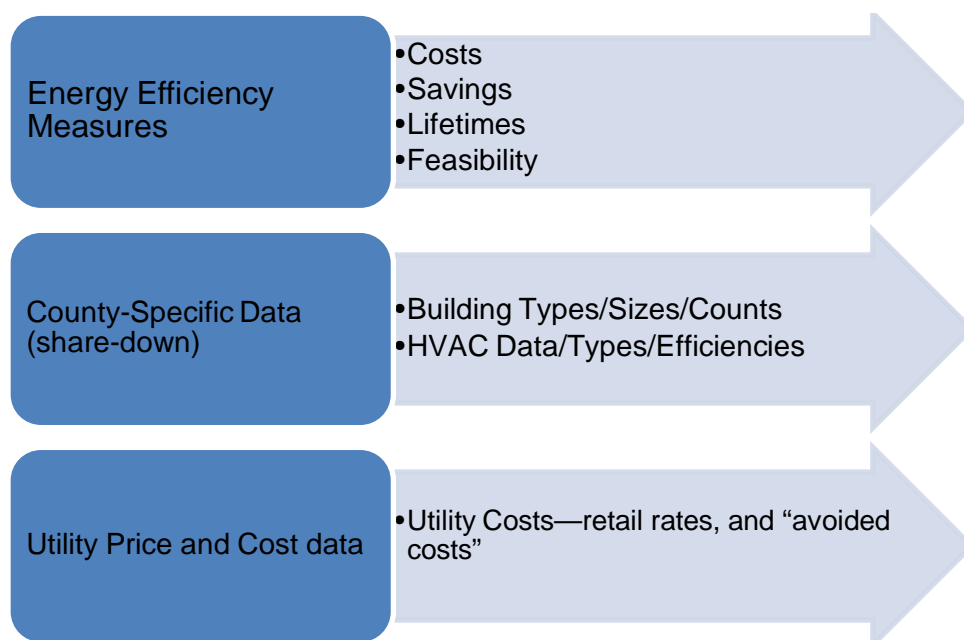
This Study is a policy analysis, not a program planning exercise. In program planning, individual efficiency measures are typically bundled into a sector-focused program. For example, a commercial lighting program will typically include a number of specific measures, each one well-quantified using a planning model like EEPM. The planning process draws on the experience of similar programs in other states to estimate participation, measure installation, and other key data needed to develop realistic impact estimates for the program. In this Study, the County is examining a wide range of policy and program options, many of which have limited field results data, and many of which are hard to specify in terms of which measures will be installed in which buildings, in what numbers, etc. For example, if the County were to implement a mandatory building energy performance benchmarking policy, it is likely that some buildings would use the benchmarking information to improve performance, but there is little data on what

specific measures they would take to do so. This lack of precision and field data makes it difficult to quantify the impacts of any one policy or program option.

Due to these differences, the estimated impacts of specific policy or program options are highly approximate, and depend heavily on reasonable but imprecise assumptions. The impact estimates for specific policies in this report should be viewed as comparative and indicative only; they intend to provide some comparisons among policy and programs as to their potential contributions toward achieving the 25% savings goal.

The EEPM model's key inputs are illustrated in Figure 9.

**Figure 9. EEPM Model Inputs**



EEPM takes into account very detailed information on thousands of efficiency measures, including their energy savings performance, service lifetime, installation costs, and technical feasibility in specific applications. This data comes from recognized regional and national databases and reference manuals.<sup>3</sup> EEPM also derives County-specific data on the building stock, including building types, floor area, and heating/cooling system types and efficiency levels from a combination of bottom-up sources like the property tax database, and from top-

<sup>3</sup> The two principal reference manuals used in this study were:

- Mid-Atlantic Technical Reference Manual (TRM) Version 2.0 - Vermont Energy Investment Corporation (VEIC) and Northeast Energy Efficiency Partnerships; and
- New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs (commonly referred as NYS Tech Manual) – New York Department of Public Service.

down sources like the Maryland Baseline Study and the federal Energy Information Administration’s Commercial Building Energy Consumption Survey (CBECS). These national and state data sources are apportioned to the County level via “share-down” techniques that use various factors to estimate the share of national/state data that can be attributed to the County. It also incorporates local energy cost information, including both retail utility rates and fuel prices for each affected customer class, and “avoided costs”, which are cost estimates developed by the PSC and utilities to approximate the avoided generation, transmission, and distribution costs that would be avoided by the serving electric utility. Avoided costs are typically lower than retail rates. Further information on EEPM and the modeling methodology is found in Appendix A.

Using these key inputs, EEPM projects estimates of total installed measures, and cumulates the savings from each measure into an aggregate savings total. It also tallies cost estimates for the installed measures, and can apply cost-effectiveness tests as indicated. EEPM can examine almost any combination of measures under various program design scenarios, though the precision of such estimates varies depending on the availability of reliable data on program impacts in other jurisdictions.

Figure 10 outlines the kinds of efficiency measures that EEPM examined for this study. ICF examined measures in two tiers: Tier 1 measures are those that have proven cost-effective in utility programs, and are regularly used in the marketplace. Tier 2 measures are not always cost-effective in a utility program context, but are included in this Study because the County’s Climate Protection Plan’s goal of 25% energy savings is aggressive enough that it requires a thorough consideration of full technical potential in a “no stone unturned” approach.

**Figure 10. Commercial Building Efficiency Measures Examined in the EEPM Model**

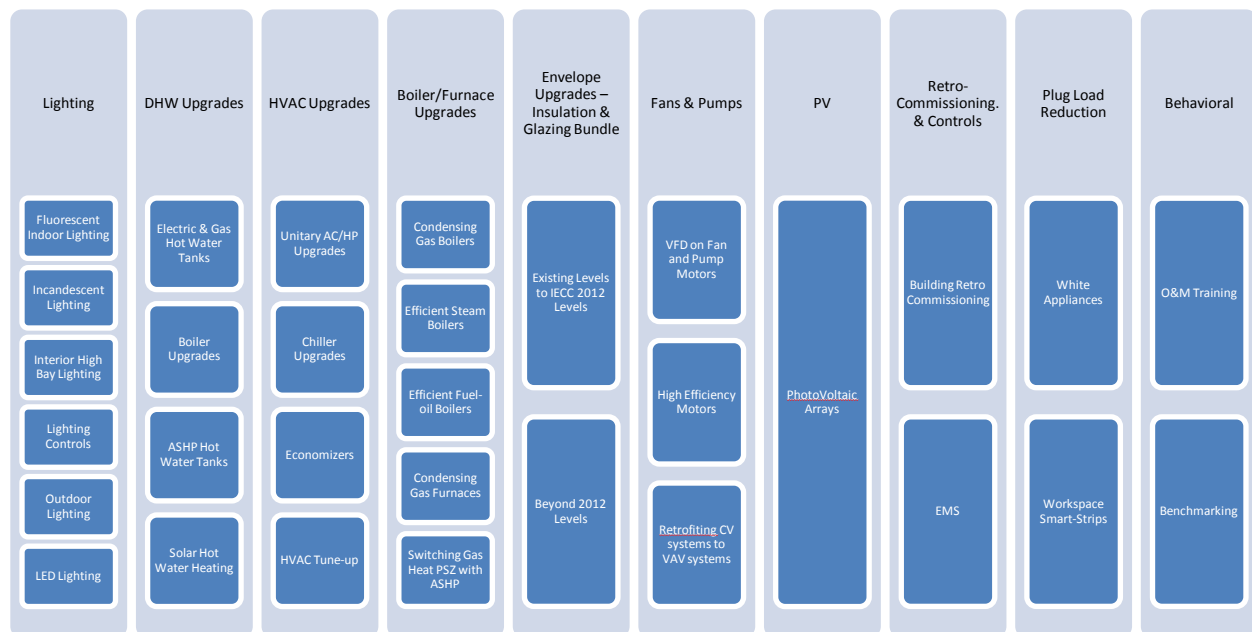
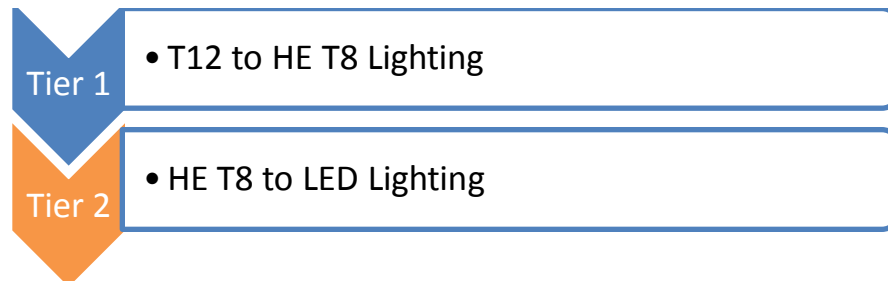


Figure 11 illustrates this two-tier approach, in this case examining a high-efficiency T8 lighting measure as a Tier 1 measure, and an LED (Light-Emitting Diode) measure as a Tier 2 option. This approach ensures that EEPM captures the full economic potential.

**Figure 11. Two-Tier Efficiency Measure Approach**



## 2.6 Market Barriers

This Study also sought to gain insights into the market barriers and other forces that affect the ability of building owners, managers, and occupants to improve energy performance in their buildings. The stakeholder survey, whose results are presented in greater detail in a subsequent section, included a set of questions on respondents' perceptions of market barriers. Other issues also emerged during the stakeholder interviews when exploring the details of specific policies and their effect on the lives of stakeholders in the commercial sector. Figure 12 summarizes respondent's replies to these questions.

From the stakeholder research and other sources, it is apparent that multifamily properties face significantly greater market barriers to energy efficiency investment than other sectors. More than half of the County's multifamily residential units are rental, therefore most of the multifamily stock is subject to the split-incentive or principal-agent problem, where tenants typically have individual meters and thus pay energy bills directly, but landlords must pay for energy upgrades. However, even in master-metered properties where utilities are included in rent, which in theory provides more direct incentive for landlords to reduce energy costs, competitive rent pressures and difficulties in accessing financing can limit such investments. In condominium buildings where the owners are the occupants, decisions on building-wide improvements must be approved by the owners association, and such decisions may not be easy to reach.

**Figure 12. Owner/Manager Respondents' Market Barrier Perceptions**

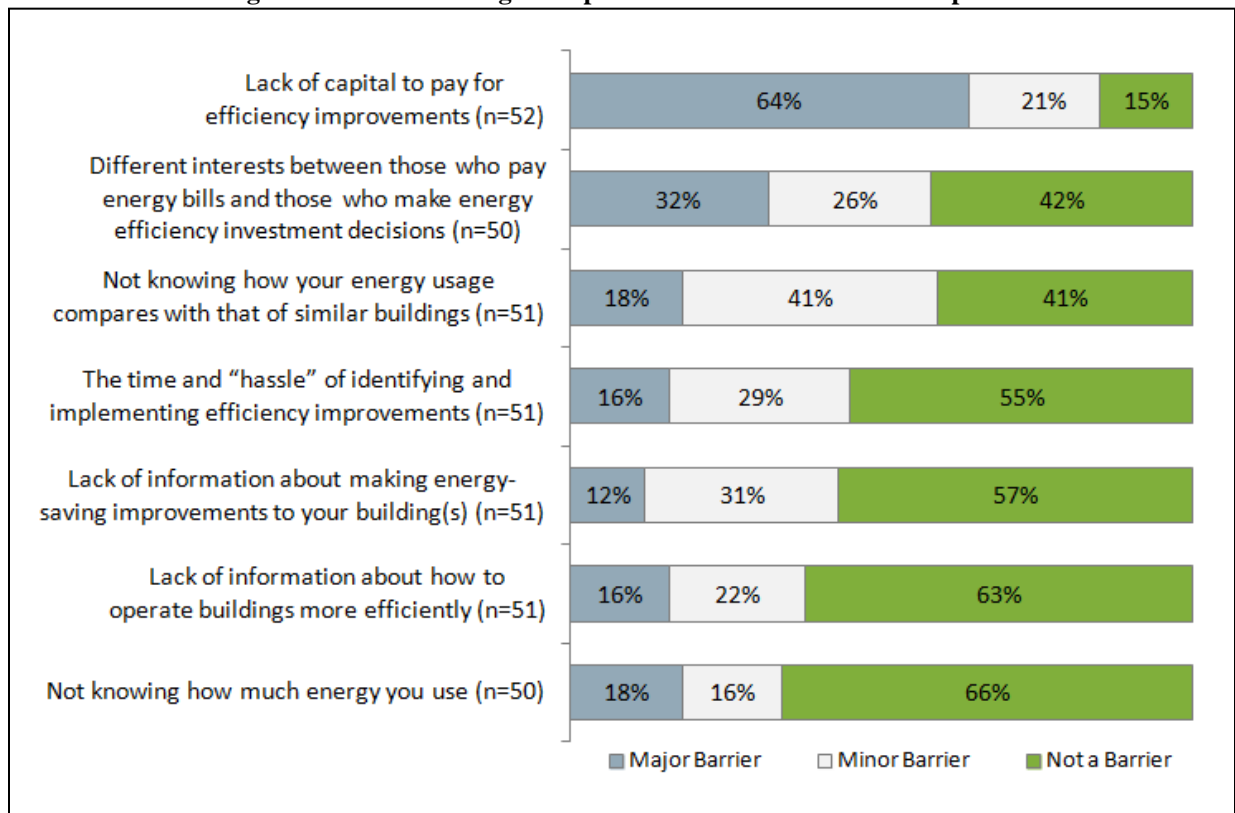


Figure 12 summarizes owners' and managers' responses to the question "From your perspective, how much of a barrier do the following factors pose to your efforts to make your building(s) more energy efficient?" The graphic indicates that three barriers are seen by respondents as significant. By combining "major barrier" and "minor barrier" scores, we can see that the three barriers for which combined scores exceed 50% of respondents are lack of capital, split-incentive or principal-agent barriers, and lack of benchmarking data to compare one's own usage to that of others. The top ranking of the capital-access barrier suggests that, at least for measures with significant costs involved, financing and incentives are important areas of focus for County policies. The split-incentive barrier suggests that tenant-occupied space should be a major focus, which points to multifamily and office buildings as the largest sectors dominated by rented space. The benchmarking barrier suggests that energy information provided through benchmarking and related policies could be an important part of the County's policy portfolio.

Further discussion of market barriers and related issues as they affect particular policy and program options occurs in the policy descriptions in Section 3 and in the stakeholder feedback in Section 4.

## 2.7 Fuel and Related Technology Substitution Considerations

It is important to understand key analytical issues that can have significant policy implications such as fuel and related technology substitution considerations. This affects the way the energy efficiency of a specific technology is calculated, and the way that energy use is translated into CO<sub>2</sub> emissions. The central analytical issue is whether to measure energy consumption and energy savings in “site” or “source” Btu terms. Site energy usage is measured as the direct Btu content of an energy source as it is delivered to and consumed on the site of an end-use energy user’s facility. Source energy usage is measured as the total energy consumed in converting and delivering energy to the user site. The site vs. source question arises most commonly in comparing direct fuel use and electrically-powered technologies at the site. Electric technologies typically show relatively high site efficiency compared to direct fuel use technologies, but direct fuel use measures can often compete well on a source-efficiency and on a cost-of-operation basis. Further, Combined Heat and Power (CHP) technologies could show significant savings potential from a source-energy or a CO<sub>2</sub> perspective. In CHP systems, a single fuel source produces both electricity and useful thermal energy; commercial-sector CHP applications are becoming more common in the marketplace.

A related analytical issue is measuring CO<sub>2</sub> emissions impacts of energy-using technologies. To measure CO<sub>2</sub> impacts, the analyst must not only consider source-energy impacts, but also the carbon content of the fuels involved. The carbon-content issue becomes more challenging in projecting impacts far into the future, because the carbon content of energy sources can change substantially. Maryland, like many states, has a renewable electricity policy that will increase the fraction of low-or-no-carbon power generation over time. In addition, significant shifts from coal to natural gas are beginning to appear in regional power generation markets, reducing CO<sub>2</sub> emissions per kWh by about half. These considerations make projecting the carbon impacts of any specific set of end-use technologies or policy scenarios additionally challenging.

Since this Study focuses on quantifying energy savings in commercial and multifamily buildings within the County, the most appropriate analytical approach is to use conventional “site energy” savings calculation, which measures the amount of energy saved directly at the site. This is the most concrete and focused approach for estimating energy savings in most program designs. However, given the County’s context in pursuing this Study as part of its Climate Protection Plan, the source-energy and net-CO<sub>2</sub> perspectives are also appropriate to consider. While these considerations are beyond the scope of this Study, policymakers and other stakeholders may wish to address them in other forums or in the development of a comprehensive energy strategy for the County.

## 2.8 Commercial Buildings Technical Potential Modeling Results

The EEPM results for commercial buildings (multifamily building potential modeling results are reported in the next section) show that the County’s 25% energy savings goal is nearly attainable on a technical basis. If all the measures considered in this analysis were installed instantaneously in all County commercial buildings, without regard to cost, energy use would be reduced by

22.1%. To reiterate the important provisos stated earlier, this figure is not likely to be reached using the technologies currently used in these kinds of modeling studies. Cost-effectiveness considerations, coupled with market barriers and other market forces, will limit what can realistically be achieved. At the same time, new technologies continue to emerge, and a new wave of continuous-improvement-based energy management is driving energy performance using mainly operational improvements. As these trends emerge, they may enable County building owners and occupants to enjoy energy savings not captured within the limits of this study.

Figure 13 summarizes the commercial building technical potential by building type, showing which sectors hold the greatest savings potential. The largest savings appear in the office building and retail types, which together account for more than half the technical potential. Across all building types, the most significant energy savings measures fall in the lighting, heating and cooling (HVAC), and domestic hot water (DHW) technology categories. However, there may be longer-term, under-quantified savings potential, in such areas as retro-commissioning and other operational improvements, especially in the usage patterns of plug loads (occupant-installed equipment such as computer systems, office equipment, and appliances). These could become more substantial sources of savings under strategic energy management programs, which cannot be fully modeled with a discrete-measure-driven model like EEPM. In later sections, ICF attempts to approximate such impacts through assumption-driven policy scenarios. However, such savings are not as robustly based on the empirical, measured energy savings in the databases and reference manuals that EEPM and other models rely on, and so they are not included in the core technical potential analysis.

**Figure 13. Commercial Building Technical Potential Energy Savings by Building Type**

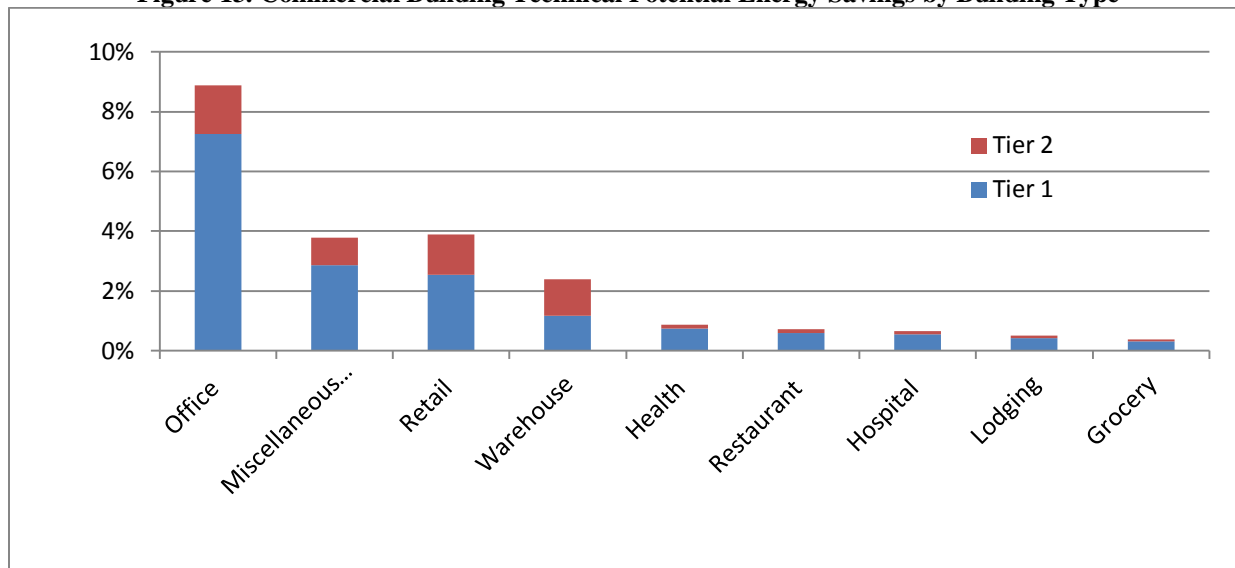
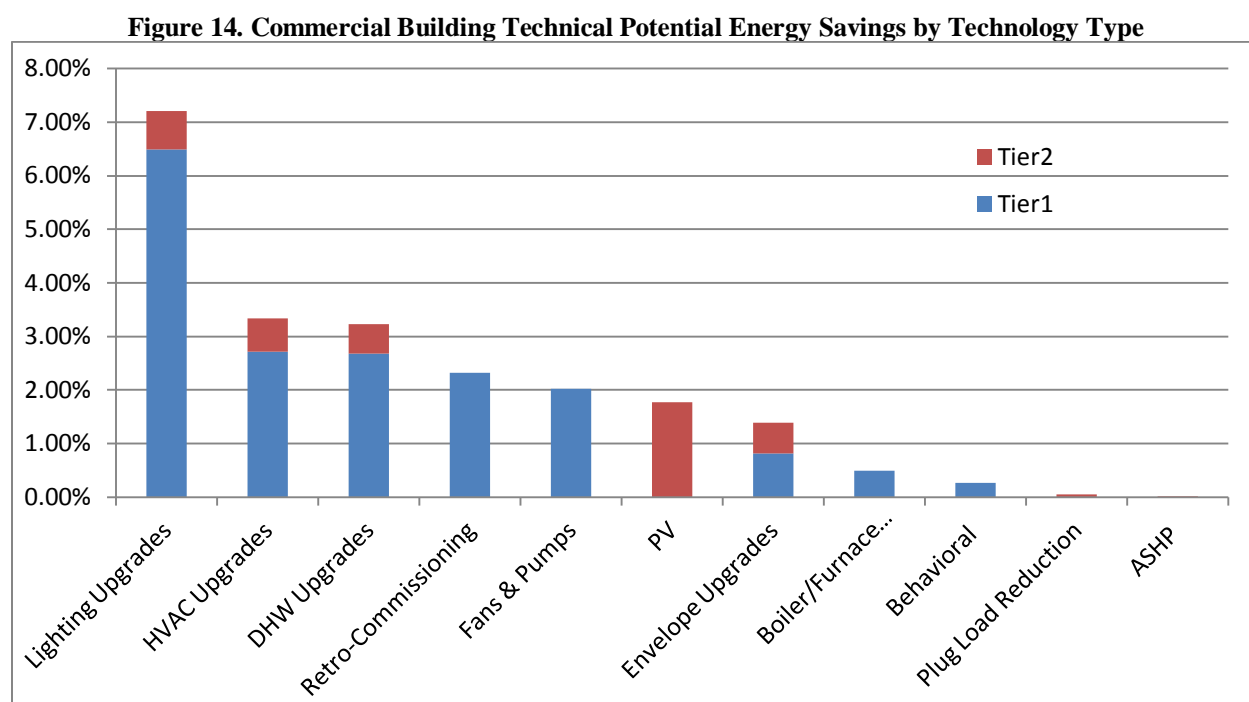


Figure 14 shows the commercial building savings potential, but broken out by technology type instead of building type. This figure shows, as is typical in the commercial sector, that the greatest savings potential lies in lighting, followed by HVAC.



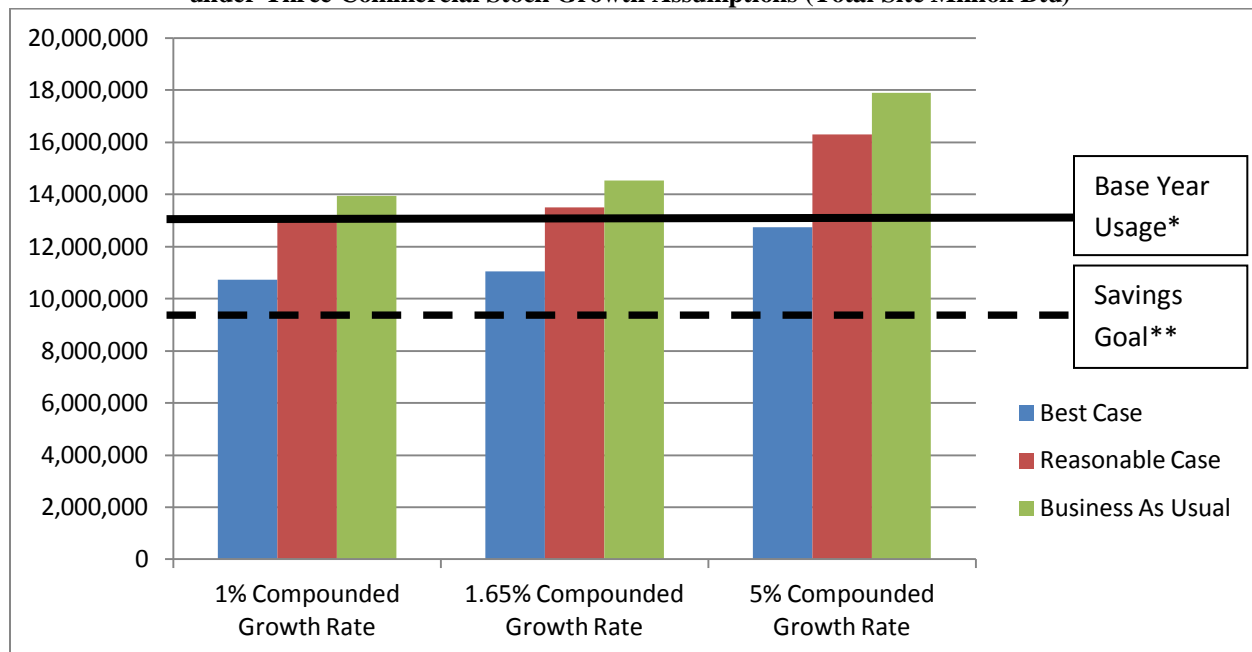
The savings summarized in Figure 14 are instantaneous, time-independent numbers. Because the County's savings goal is to achieve these savings over ten years, the analysis must take into account the effects of economic growth, which will expand the total square footage of the commercial sector in future years. Because the Climate Protection Plan's 25% savings goal was stated in absolute terms rather than relative terms, total energy savings would have to overcome the growth in energy use associated with expansion of the building stock. To represent these factors, ICF simulated high, medium, and low commercial stock growth rates, and against these modeled high, medium and low energy savings scenarios. The three growth rates are 1%, 1.65% (based on a 20-year average of commercial stock growth), and 5%. These rates were chosen to bracket a range of high, low, and moderate growth assumptions. The three energy savings cases are:

- High (best case)
  - 22.1% reduction from existing buildings – Full Technical Potential
  - 45% savings in new buildings compared to ASHRAE Standard 90.1-2010. The ASHRAE 90.1 standard is the nation's consensus technical standard for commercial and multifamily building construction; its technical criteria are typically migrated into building codes such as the IECC, which the County implements as part of its state-mandated building code administration responsibilities.
- Medium (reasonable case)
  - 6.7% reduction from existing buildings – 30% of Technical Potential

- 15% savings in new buildings compared to ASHRAE Standard 90.1-2010
- Low (worst case)
  - 0.7% reduction from existing buildings – 3% of Technical Potential
  - New buildings energy performance equivalent to ASHRAE Standard 90.1-2010

Figure 15 compares these three energy savings cases against the three building stock growth rate assumptions. The horizontal solid line in the graph represents base year energy usage, and the horizontal dashed line represents usage levels if the full technical potential were realized. It becomes immediately apparent from this figure that to come close to the 25% savings goal, building stock growth would have to be very low, below historical averages, and that building codes would have to advance to levels 45% beyond current (2010) ASHRAE Standards (current ASHRAE standards are typically used by architects and engineers for design guidance, and are roughly equivalent to the 2012 IECC energy code, but the IECC is used to assess code compliance under Maryland law). Assuming historical growth rates, an aggressive building codes scenario could bring total usage close to the target, assuming that the full technical potential of the entire existing building stock were realized. As described earlier, full technical potential is not realistically attainable, as it ignores costs, market barriers, and the time it takes for markets to adopt new technologies. Yet the aggregate modeling results show that it is worth exploring the most promising paths toward realizing significant amounts of this potential.

**Figure 15. Commercial Buildings Technical Energy Efficiency Potential under Three Commercial Stock Growth Assumptions (Total Site Million Btu)**



\*Base year usage is derived from a composite of county, state and federal sources from the 2009-2011 period.

\*\*The savings goal is 25% reduction from the base year usage.

## 2.9 Multifamily Buildings Technical Potential Modeling Results

ICF modeled multifamily buildings separately from commercial buildings. Technical differences between these two building stocks entailed examining a somewhat different set of efficiency measures, and data limitations required application of set of assumptions to complete the baseline characterization.

Figure 16 summarizes the measures examined for multifamily buildings. These measures tend to be more like residential measures applied in single-family housing, such as appliance and lighting measures. Some are like commercial measures, such as common-area lighting and central HVAC.

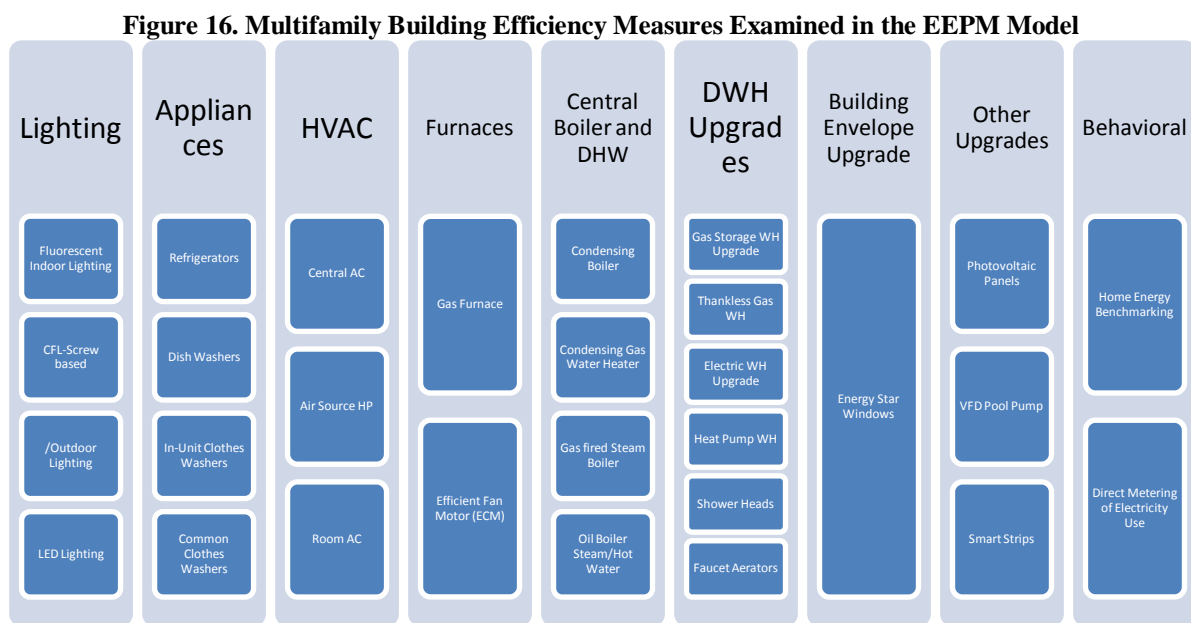
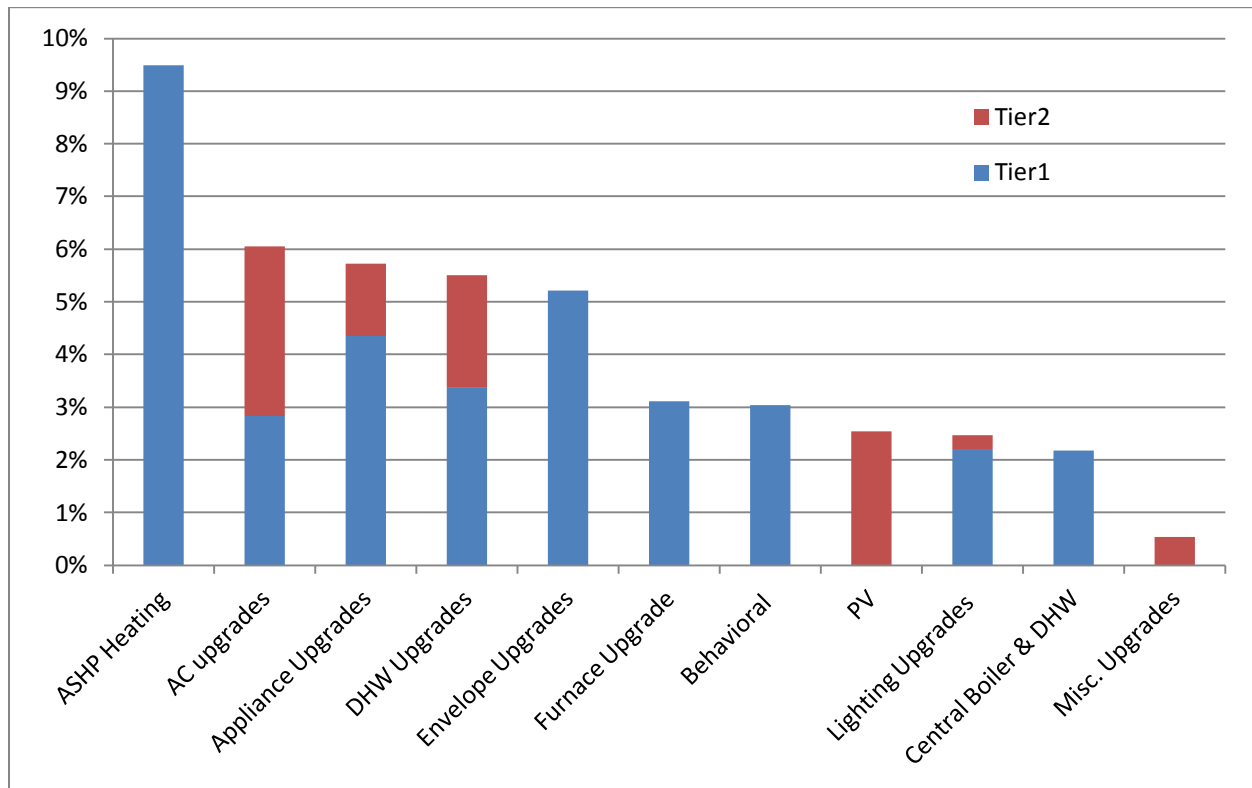


Figure 17 summarizes technical energy savings potential for the multifamily building sector by technology type. As with commercial measures, ICF used a two-tier approach, with Tier 2 measures representing the most advanced technologies. To explain some of the labels in Figure 17, The ASHP Heating bar represents the savings potential from replacing electric resistance furnaces with efficient air source heat pumps at 10 HSPF. The AC Upgrades bar is for savings from upgrading existing central air conditioning systems from the current average of SEER 11 to SEER 14.5 (Tier 1), and then from SEER 14.5 to SEER 24.5 (Tier 2). The Furnace Upgrade represents savings from upgrading existing gas furnaces (assumed average efficiency of 70% AFUE) to condensing gas furnaces at 96% AFUE.

**Figure 17. Multifamily Technical Potential Energy Savings by Technology Type**

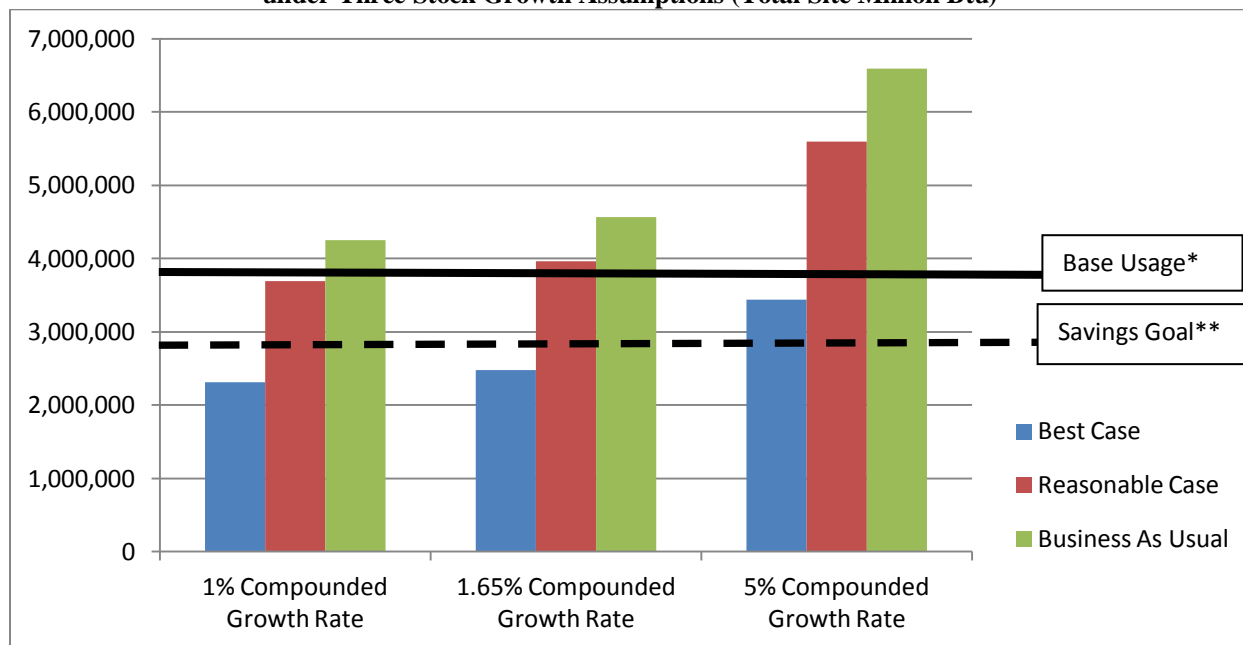


As with commercial building stock, to project a ten-year savings potential the analysis had to assess technical potential against projected growth in square footage. To represent these factors, ICF simulated high, medium, and low commercial stock growth rates, and modeled these against high, medium and low energy savings scenarios. These savings scenarios also include assumptions about the efficiency of new buildings. The three growth rates are 1%, 1.65% (based on a 20-year average of commercial stock growth), and 5%. The three efficiency potential cases are:

- **High (Best Case)**
  - 46.2% reduction from existing buildings – Full Technical Potential
  - 45% Energy Reduction From New Buildings compared to ASHRAE 90.1-2010
- **Medium (Reasonable Case)**
  - 13.6% reduction from existing buildings – 30% of Technical Potential 15% Energy Reduction From New Buildings compared to ASHRAE 90.1-2010
- **Low (Worst Case)**
  - 1.4% reduction from existing buildings – 3% of Technical Potential
  - Current Code Based on ASHRAE 90.1-2010

Figure 18 summarizes these results. Although the absolute numbers are different than those for commercial buildings, realizing the County’s energy savings goal requires very aggressive energy codes for new buildings—45% better than current ASHRAE standards—plus full installation of all measures in existing buildings. Neither of the medium cases attains the goal.

**Figure 18. Multifamily Buildings Technical Efficiency Potential under Three Stock Growth Assumptions (Total Site Million Btu)**



\*Base year usage is derived from a composite of county, state and federal sources from the 2009-2011 period.

\*\*The savings goal is 25% reduction from the base year usage.

## 2.10 Combined Technical Potential Modeling Results

ICF combined the results of the commercial and multifamily potential analyses to produce an overall assessment of technical potential to meet the County’s 25% savings goal. The combined results are shown in Figure 19. While the potential savings in commercial buildings fall just short of the goal, multifamily buildings show a higher percentage savings potential; combining the two produces a total savings potential that narrowly exceeds the goal. As previously noted, these numbers are only technical potential estimates, and do not reflect the cost-effectiveness, market-barrier, and other issues involved in achieving these savings under real market conditions. For these reasons, the modeling results should be viewed as indicative. The savings exist on a purely technical basis, but it will be extremely challenging to realize them. Nonetheless, they provide encouragement to the County’s efforts to pursue policy and program options that could realize substantial portions of these potential savings.

**Figure 19. Combined Commercial and Multifamily Technical Potential**

Sector	Data Description	Electricity: Baseline MWh and Percent Savings	Fossil Fuel: Baseline therms and Percent Savings	Total Energy: Baseline Million BTU and Percent Savings
<b>Commercial</b>	<b>Baseline</b>	1,976,615	56,265,770	13,168,550
	Technical Potential Savings	36.1%	8.4%	<b>22.1%</b>
<b>Multifamily</b>	<b>Baseline</b>	844,415	9,654,507	3,846,705
	Technical Potential Savings	46.8%	44.3%	<b>46.2%</b>
<b>Total Commercial and Multifamily</b>	<b>Baseline</b>	2,821,030	65,920,277	17,015,256
	Technical Potential Savings	39.3%	13.7%	<b>27.5%</b>

Note as well that Figure 19 does not address expected growth in the building stock over the next ten years. As shown earlier in Figures 14 and 17, very aggressive building energy codes as well as full realization of technical potential savings from existing buildings would be needed to achieve the County's 25% savings goal over the next ten years.

**Figure 20. Combined Commercial and Multifamily Technical Potential by Building Type  
(percent of baseline site energy use)**

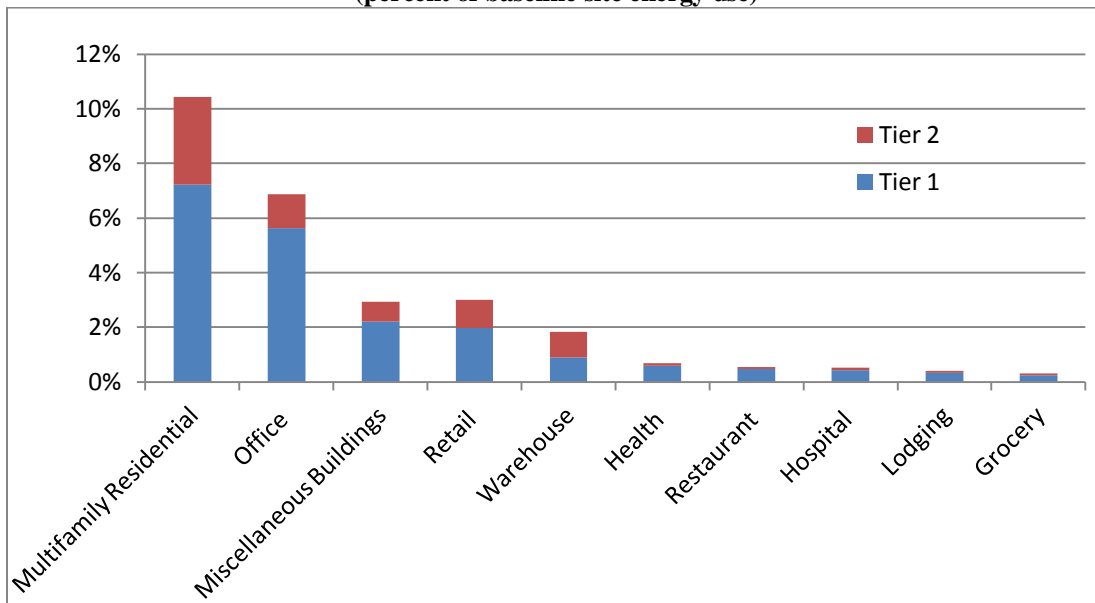


Figure 20 shows the distribution of technical potential savings by building type. It is noteworthy that multifamily buildings hold the largest share of savings potential, followed by office buildings, miscellaneous, and retail. Because the miscellaneous category is so diverse,

comprising parking lots and other outdoor facilities as well as post offices, fire stations, and religious buildings, it is difficult to address from either technical or policy perspectives. For practical purposes, multifamily, office, and retail buildings stand out as holding the great majority of energy savings potential.

## 2.11 Policy Scenario Analyses

A key goal of the Study is to link potential energy savings in technical terms to the policy and program options that might be best suited for achieving those savings. ICF applied the EEPM model and various assumptions to attempt to simulate the impacts of policy scenarios that resemble the ten types of policies and programs examined in the Study. These ten policy types are described in detail in Section 3.0. Readers unfamiliar with these policies may wish to read those sections before considering the analyses in this section. ICF presents the analytic results here for the sake of continuity and completeness in reporting the quantitative results of the Study.

It should be noted that the quantitative results of these scenarios must be viewed with very limited expectations. While EEPM is an accurate tool for modeling specific technical efficiency measures in specific building types, it can only provide rough and approximate estimates of the impacts of broad policies. This is because it is not possible to precisely map a given policy onto a specific set of buildings or efficiency measures. If the County were to require energy performance benchmarking, for example, it is not possible to predict exactly which building types will respond by saving energy, nor which measures those buildings would pursue. Moreover, there is limited field experience with many of these policies, and therefore hard data on their impacts is not readily available. For these reasons, ICF relied on assumptions to estimate quantitative impacts. Thus, these results thus should be viewed cautiously.

### *Benchmarking and Disclosure Policy Scenarios*

To simulate the potential impacts of benchmarking and public disclosure policies, ICF developed three voluntary scenarios, assuming three levels of annual participation, and a 10% annual increase in participation, yielding relatively high levels of cumulative participation:

- 1% annual participation – 16% cumulative participation over 10 years
- 2% annual participation – 32% cumulative participation over 10 years
- 3% annual participation – 48% cumulative participation over 10 years

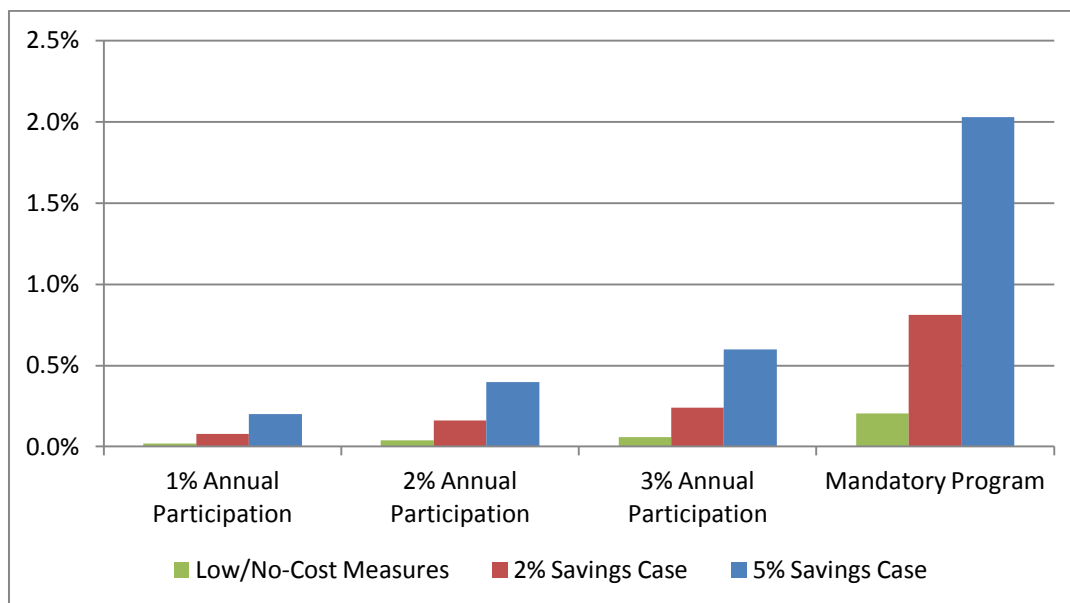
In the third scenario (a voluntary approach in which 3% of buildings participated each year, and participation rose by 10% each year for 10 years) about half of the building stock would be benchmarked, with public disclosure, after ten years. All these scenarios assume that all participants continue to participate for all years of the Study.

ICF also developed a mandatory benchmarking/disclosure scenario, where benchmarking and public disclosure of energy performance data in buildings above a certain size would be required every five years. In both mandatory and voluntary scenarios, two bases for savings were examined: nominal 5% and 2% per year annual reductions in usage simply from the effects on the awareness of benchmarking, and installation of a set of low cost to no-cost measures such as simple shutoff of lighting and plug loads when not in use, and changing procurement practices to specify ENERGY STAR office equipment. The 5% assumption comes from a recent Institute for

Market Transformation study,<sup>4</sup> and the 2% assumption from a Journal of Policy Economics article.<sup>5</sup>

Figure 21 summarizes the results of this scenario analysis. The absolute savings totals are not large; even under a mandatory benchmarking scenario, savings total less than 1% of total energy use after 10 years. This is partly due to the nominally-low 2% savings figure that can be applied to benchmarking as a stand-alone policy. While benchmarking could drive significantly larger energy savings, depending on how the information is used and how market forces respond, this analysis was forced to limit itself to relatively modest savings projections. This suggests both that better field data is needed on the impacts of benchmarking policies, and that benchmarking might be most effective if linked to a broader policy and program portfolio, so that the energy performance information can be more effectively applied. For example, Pepco's retro-commissioning program requires benchmarking using the Portfolio Manager software as part of the program design. In that case, retro-commissioning studies and operational improvements drive savings, and the benchmarking data serves as a feedback device to measure progress. The City of Austin, for example, closely links its benchmarking/energy audit regulations closely to the City's utility-run incentive programs, and provides exemptions for buildings that have used utility incentives to make significant efficiency improvements within the last 10 years.

**Figure 21. Project Annual Energy Savings from Voluntary and Mandatory Benchmarking (Percentage of aggregate energy usage)**



<sup>4</sup> Burr et al. 2012. Op cit.

<sup>5</sup> Hunt. 2011. Op. cit.

### *Retro-Commissioning (RCx) and Energy Audit Policy Scenarios*

Similar to the benchmarking policy scenario analysis, ICF simulated both voluntary and mandatory RCx scenarios. Because there is more field experience and evaluation results available for RCx voluntary programs, ICF was able to estimate low, medium, and high savings levels at 5%, 10%, 20% respectively.<sup>6</sup> Voluntary RCx program experience also suggests a typical range of participation rates in the 1% to 3% range. As with the voluntary benchmarking policy scenarios, ICF applied an assumption of a 10% annual increase in participation, such that cumulative participation would be:

- 1% annual participation – 16% cumulative participation over 10 years
- 2% annual participation – 32% cumulative participation over 10 years
- 3% annual participation – 48% cumulative participation over 10 years

ICF also developed a mandatory RCx scenario, in which RCx or energy audits would be required every 5 years. Both scenarios assume 5-year persistence for RCx measures.

RCx scenarios were limited to buildings of certain types and sizes, based on field experience that indicates the RCx is most impactful in larger buildings with complex HVAC and control systems. The analysis was limited to buildings 20,000 to 50,000 sq. ft. or larger (depending on building type) in the office, healthcare, hotel, retail, and restaurant sectors; buildings above this size level typically have engineered HVAC systems with automatic controls, which typically respond well to RCx methods. Multifamily buildings were not included because their HVAC/control systems do not typically lend themselves to RCx approaches.

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<sup>6</sup> Mills, Evan. 2011. “Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions in the United States”. *Energy Efficiency*. Vol. 4 (2). PP. 145–173. Springer.  
<http://evanmills.lbl.gov/pubs/pdf/cx-enef-mills.pdf>

Robbins, Allie and Moser, Dave. 2007. “Developing a Retrocommissioning Plan: Best Practices & In-Practice” presentation by PORTLAND ENERGY CONSERVATION, INC (PECI),  
<http://www.energystar.gov/ia/business/networking/presentations/Sep07RetroCommissioning.pdf>

Thorne, Jennifer and Nadel, Steven. 2003. *Re-commissioning: Program Strategies to Capture Energy Savings in Existing Buildings*. American Council for an Energy Efficiency Economy (ACEEE), Washington, DC.  
<http://www.aceee.org/research-report/a035>.

Figure 22 summarizes the building types and sizes considered in the analysis.

**Figure 22. Building Types and Sizes Included in RCx Policy Analysis**

	Gross Floor Area (ft <sup>2</sup> )	Number of Buildings
Offices 20,000 to 50,000 ft <sup>2</sup>	6,245,881	191
Offices over 50,000 ft <sup>2</sup>	53,265,910	333
Health & Hospitals over 20,000 ft <sup>2</sup>	4,211,197	53
Hospitality over 50,000 ft <sup>2</sup>	2,705,702	24
Retail over 50,000 ft <sup>2</sup>	20,004,990	152
Food Service over 50,000 ft <sup>2</sup>	365,760	3
<b>Total</b>	<b>86,799,440</b>	<b>756</b>

Figure 23 illustrates the relative impacts of RCx by building type. Note that this graphic is based purely on technical potential, overlooking the participation issues captured in Figure 24. Figure 23 shows that the great majority of technical potential for RCx lies in the office building sector; offices hold more RCx potential than the other building types combined.

**Figure 23. RCx Technical Potential by Building Type**

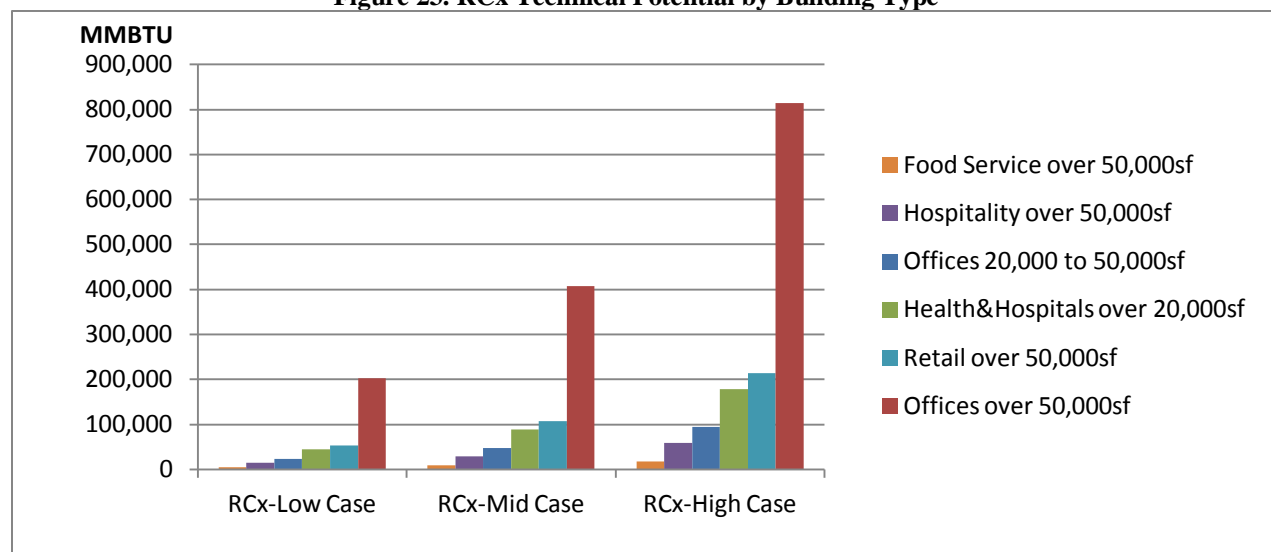
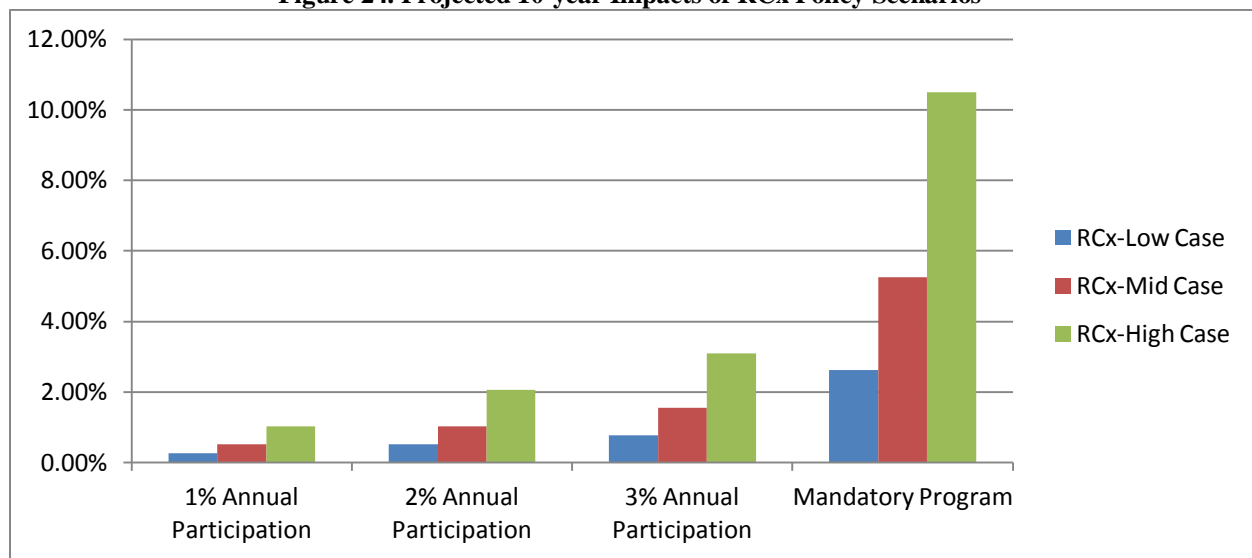


Figure 24 projects the impacts of RCx policies over ten years, including both voluntary and mandatory approaches. It shows relatively high savings potential: at the far right of the graph, a mandatory program that saved an average of 20% would reduce total sector energy use by about 8% over 10 years. Note, however, that mandatory RCx is likely to create lower average impacts, as not all buildings would benefit so greatly. This suggests that a mandatory RCx policy would drive savings in the range of 2% to 5% for the sector as a whole.

**Figure 24. Projected 10-year Impacts of RCx Policy Scenarios**



### *Building Energy Codes Policy Scenarios*

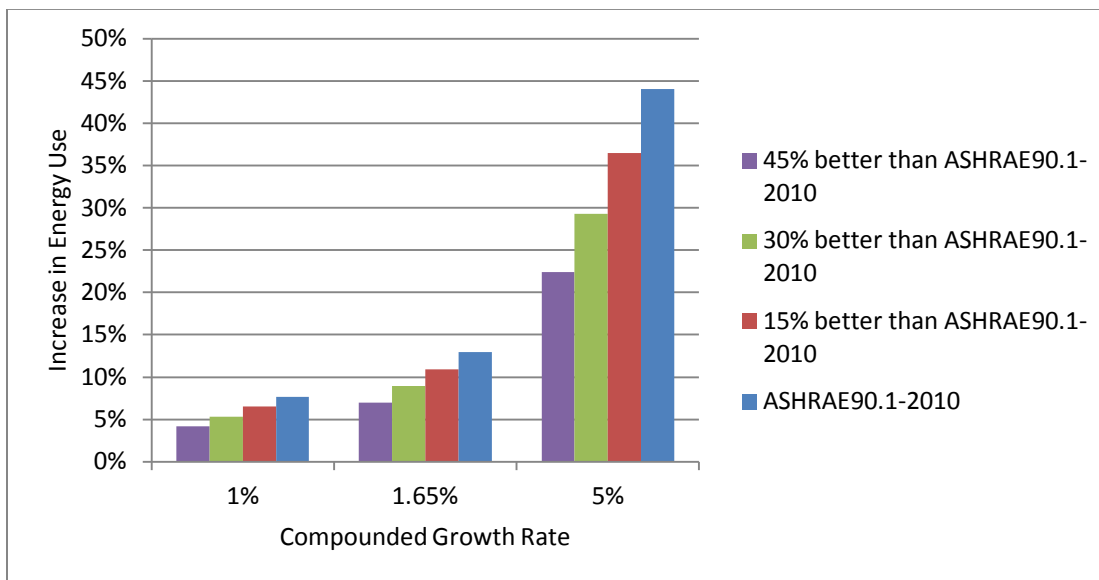
As the technical potential analysis has already shown, approaching the County’s 25% savings goal while allowing for economic growth requires aggressive energy codes to limit the growth in energy use from new construction. To simulate the effects of building codes, ICF applied the same set of scenarios as used in the technical potential analysis:

1. ASHRAE Standard 90.1 – 2010, the most current version of the nation’s predominant commercial building energy design standard. The technical standards of ASHRAE 90.1 are almost identical to those of the 2012 IECC code, which the County is implementing. The ASHRAE criteria are used in ICF’s modeling tools as consistent basis for calculating incremental savings.
2. 15% Better than ASHRAE 90.1 – 2010
3. 30% Better than ASHRAE 90.1 – 2010
4. 45% Better than ASHRAE 90.1 – 2010

Each of these levels of code stringency was applied to three assumptions about growth in total square footage: 1%, 1.65%, and 5% to bracket a range of possible growth scenarios, with 1.7% representing a 20-year historical growth rate. These scenarios were applied in the EEPM model to project the impact of more and more stringent codes on the growth in baseline energy use for the building stock.

Figure 25 illustrates the *increase* in energy use from new building construction over ten years.

**Figure 25: Impacts of Building Energy Codes in Growth of Baseline Energy Usage**



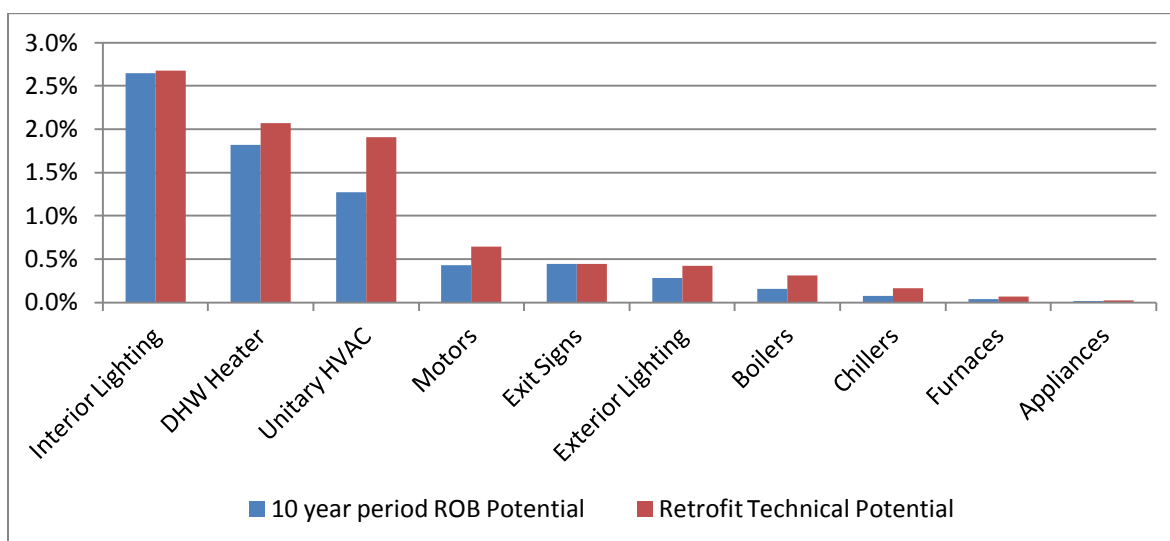
Note that total energy use could grow from 3% to 44%, depending on the assumption used for code stringency and square footage growth rate. This increased energy use increases the challenge of attaining the County's 25% energy savings goal. It therefore places added importance on implementing stringent energy codes; if such codes are not put in place, energy demand will grow at such high rates that the 25% savings goal will fall further and further out of reach.

### ***Mandatory Retrofit Policy Scenarios***

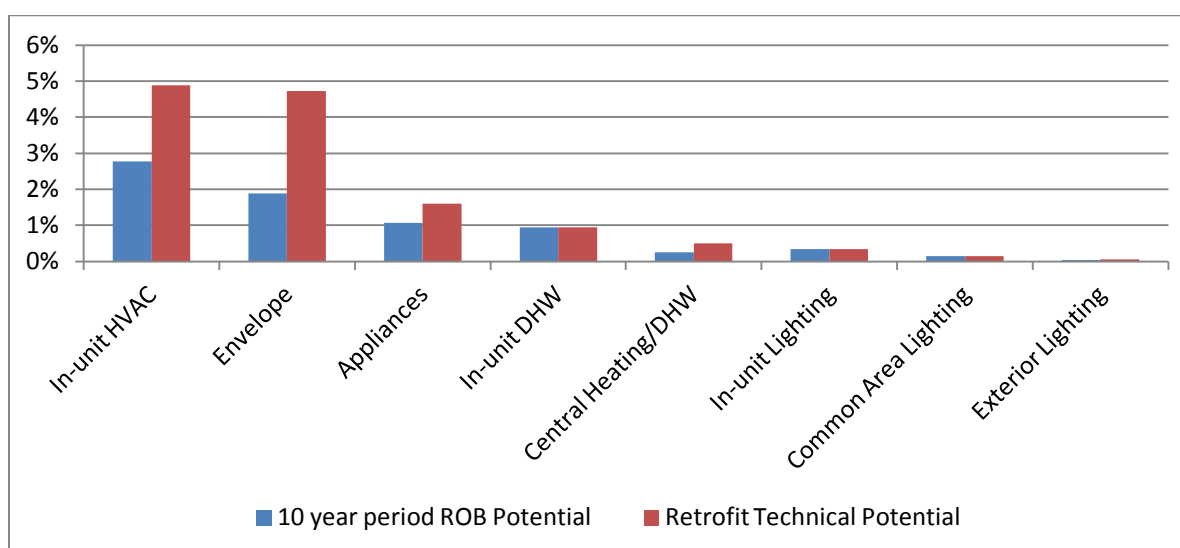
One policy examined in the Study is the mandatory installation of specific energy measures. Because the specifics of such an approach have not been well developed, the impacts of a representative set of efficiency measures on a replace-on-burnout (ROB) basis over ten years were simulated. The ROB approach estimates savings on an incremental basis: that is, the incremental savings of a high-efficiency measure compared to a standard measure. This departs from the technical potential analysis, which assumes instantaneous replacement of all devices; ROB assumes that devices are replaced only at the end of their estimated service lives. Figures 26 and 27 show these results for commercial and multifamily buildings.

In Figures 26 and 27, the red bars represent the full technical potential, as shown earlier. Full technical potential is time-independent, and assumes that all measures are installed instantly. For the mandatory-retrofit policy scenario, the assumption is that measures are installed on a ROB basis, as existing equipment fails or is retired.

**Figure 26. Mandatory Retrofit Savings from Selected Commercial Measures**



**Figure 27. Mandatory Retrofit Savings from Selected Multifamily Measures**



This analysis indicates that substantial savings could be realized if a policy were established that was able to mandate replacements on burnout across all these technologies. For either commercial or multifamily buildings, on an ROB basis, mandatory retrofits could save more than 8% of total baseline energy use. However, as with all of these scenarios, no cost-effectiveness screening or market barrier assessments were factored in, which would reduce actual savings. Forcing the same retrofits across all buildings and applications would likely reduce cost-effectiveness, compared to a mandatory audit scenario, in which cost-effective measures would be identified for each building. It is unlikely that the County would choose to mandate replacement of such a wide set of measures; such mandates would be more likely to focus in on a few common, cost-effective measures. Although the nominal savings in this scenario analysis appear large, they would be unlikely to be realized in large measure.

One of the key issues this policy scenario raises is whether measures should be targeted for elective retrofit, that is, replacing working equipment with more-efficient models, or for ROB, as existing equipment fails or is retired. The cost differences between these two approaches are large: for elective retrofit, the full cost of installed measures must be used as the cost basis for economic assessment, whereas in ROB situations, the applicable cost is just the incremental cost of an efficient measure above a standard measure. The rationale for this is that in ROB situations, the device is deemed to be replaced anyway, and so a baseline cost would be assigned for installing a minimum-efficiency device. Figure 28 illustrates the difference between the full-cost and the incremental-cost bases for the measures considered in this analysis.

**Figure 28. Full Cost vs. Incremental Cost Estimates for Efficiency Measures (\$ Million)**

Sector	Full Installed Retrofit Cost	Incremental Cost/Replace-on-Burnout
Commercial	\$7,495	\$297
Multifamily	\$1,180	\$284
Total Commercial and Multifamily	\$8,675	\$581

Figure 28 shows the magnitude of the difference between the costs of elective retrofits and replace-on-burnout costs. For commercial buildings, full costs are more than 25 times the incremental costs of the measures included in the analysis. For multifamily, full costs are more than four times incremental costs. This is a major reason why utility programs typically focus on replacement markets, where incremental costs are the basis for cost-effectiveness calculations. These issues are discussed in more detail in the text explaining Figures 29 and 30 below.

### *Financing/Incentive/Grant Policy Scenarios*

This Study examines a range of financial incentive policy and program options to help commercial and multifamily buildings implement energy efficiency projects. As with many of these policy categories, there is no precise way to map such policies onto specific building types or efficiency measures. A loan program, for example, could finance any number of combinations of measures in a wide range of building types. In considering this analytical challenge, ICF determined that the most practical quantitative basis for estimating the impacts of financing and incentive programs was the current suite of Pepco energy efficiency programs for which commercial and multifamily buildings are eligible. ICF has done extensive analysis of the impacts of those programs in helping Pepco develop its program portfolio, and was able to use the aggregate impact estimates from the Pepco programs as a baseline for this policy scenario.

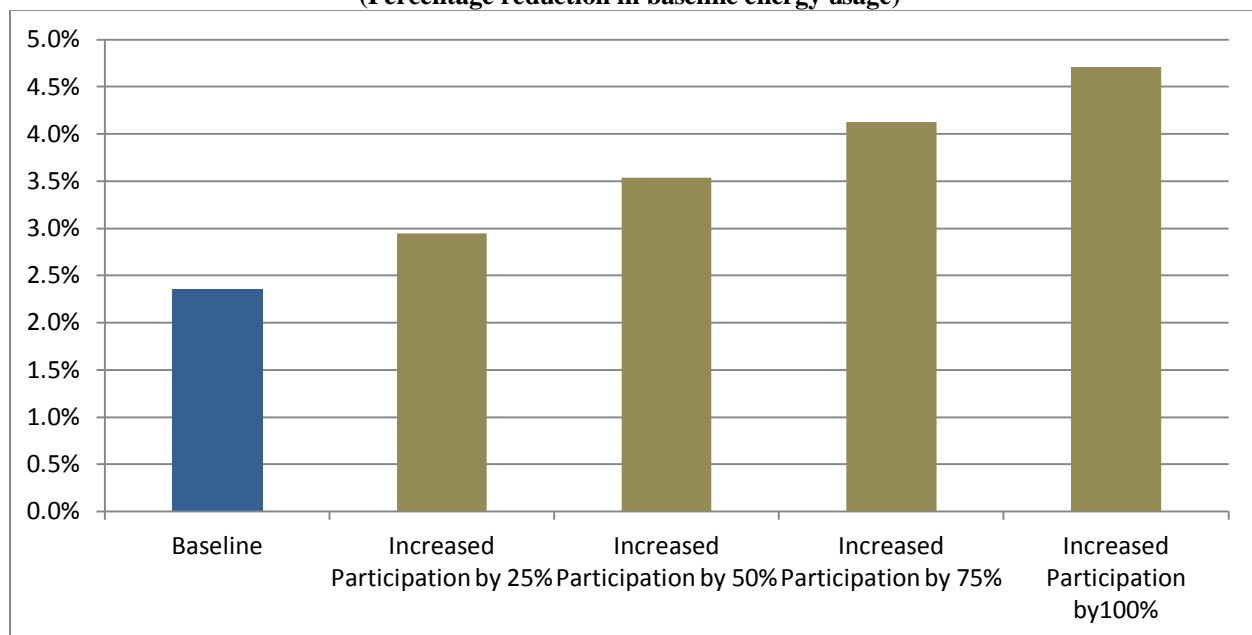
Using Pepco program impacts as a baseline, ICF developed four scenarios in which County-supported financing or incentive programs would be projected to increase the impacts of Pepco programs by defined percentages:

1. Baseline: Pepco impact estimate for 2012
2. 25% Increased impact
3. 50% Increased impact

4. 75% Increased impact
5. 100% Increased impact

Figure 29 summarizes the results of this analysis. The graph shows that current Pepco programs (if continued for ten years; they are currently authorized only through 2014) would reduce baseline energy use by less than 2.5%--about 10% of the County's 25% goal. If the County were able to mount policies and programs that could double program participation and impacts, savings would rise to almost 5% of baseline usage, attaining about 20% of the overall savings goal. Whether such policies and programs could generate impacts of this magnitude is an open question; there is no field-verified data available to support such estimates. This modeling analysis is thus indicative only, not predictive.

**Figure 29. Projected impacts of Financing and Incentive Programs  
(Percentage reduction in baseline energy usage)**



Note: baseline savings are based on estimated savings from current Pepco EmPOWER MD programs

### *Community Energy Challenge Scenarios*

Several jurisdictions are deploying voluntary challenge initiatives, using friendly competition and civic-mindedness combined with practical program tools to encourage commercial property owners to improve building energy performance. These initiatives are described in Section 3.1. The current Montgomery County Green Business Certification<sup>7</sup> program provides a framework for this kind of initiative. While it currently spans a wide range of sustainability practices, it could be linked to an energy challenge initiative.

<sup>7</sup> For more information about Montgomery County's Green Business Certification Program, visit <http://mcgreenbiz.org/>.

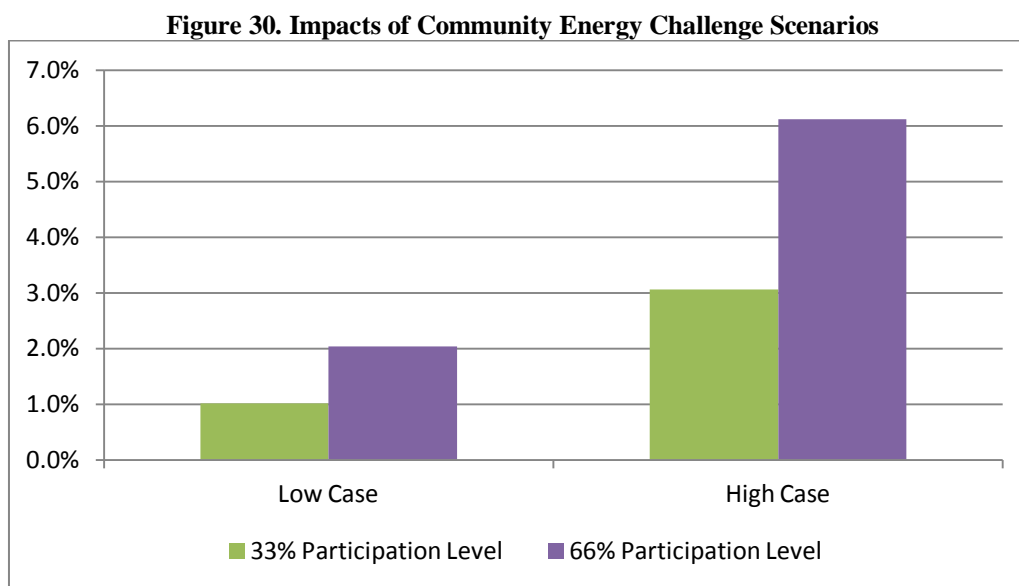
As with other policy and program categories considered in this Study, there is no precise basis for estimating impacts of a challenge-style initiative. The Arlington County Green Games is an example with applicable participation data that informed analysis of this policy scenario.

Based on the Green Games experience, four policy scenarios were developed for owners of larger office buildings (50,000 sq. ft. or larger) representing from one-third to two-thirds of the square footage in their market. Owners would commit to specific 10-year savings goals as follows:

- 10% savings, 33% of large offices
- 30% savings, 33% of large offices
- 10% savings, 67% of large offices
- 30% savings, 67% of large offices

Green Games was able to enlist one-third of Arlington County’s private office space, with participants committing to either 10% or 30% savings targets. Green Games, however, was initially a one-year challenge; the County is considering a 10-year timeframe. It was thus deemed appropriate to examine a larger program that engaged two-thirds of the larger office space market. Of course, the gap between announced commitments and measured results can be substantial; to be effective, a voluntary effort like this needs to be supported with technical assistance, regular data reporting, and measurement of progress against goals.

Figure 30 summarizes the results of this analysis. In the graph, the “low case” represents 10% savings, and the “high case” represents 30% savings. The savings over 10 years are substantial: if two-thirds of the larger office buildings in the County achieved 30% savings, that would amount in aggregate to about 6% of total baseline energy use, realizing over 20% of the County’s overall savings goal. As in all of the policy scenario analysis, it is necessary to point out that such ambitious participation and savings goals can be difficult to achieve and to sustain. The analysis should thus be used for exploratory and comparative purposes only.



## *Collective Assessment of Policy Scenario Impacts*

Quantifying the impacts of policy scenarios is not an exact science, as discussed throughout this section. Having conducted indicative impact projections for selected policy scenarios, it would seem logical to combine these results into an aggregate policy impact assessment. However, such a combined assessment would be misleading, for the following reasons:

- The policy scenarios overlap, covering many of the same sectors and measures. This would lead to double-counting and over-representation of what these policies could really achieve as a portfolio. For example, the community challenge analysis would directly double-count savings projected under the RCx and benchmarking scenarios. There is thus no straightforward way to allocate specific “chunks” of measures or savings to one specific program or portfolio, except perhaps in the mandatory-retrofit and building codes categories.
- The accuracy of these policy scenario analyses is much more limited than the basic technical potential assessment. The potential assessment was based on relatively hard data about building stock characteristics and individual efficiency measure performance. Mapping segments of this robustly-developed technical potential onto policy scenarios is much less exact, and depends heavily on reasonable but unproven assumptions. Therefore, combining these scenarios quantitatively goes beyond what is analytically reasonable.

For these reasons, ICF does not present an aggregate projection of all the policies together. Figure 31 provides a tabular view comparing a set of midrange estimates of energy savings impacts for a sample of the policy types evaluated in this study. Several caveats must be repeated in understanding the numbers in Figure 31:

- **Savings are not additive-** Many of the policies would affect the same buildings and the same measures. For example, mandatory benchmarking would drive many of the same savings as the voluntary benchmarking in the Community Challenge.
- **Modeling accuracy is limited-** While EEPM is very robust in building up impacts from individual measures, as in the technical potential estimates at the beginning of this section, it relies heavily on assumptions regarding participation rates and measures implemented in a given policy scenario.
- **Field experience is extremely limited-** The assumptions used in the policy analysis scenarios, while drawn as much as possible from experience in other jurisdictions and programs, are not based on enough field evaluation data to be useful as reliable predictors of impacts in other jurisdictions.

It is also worth observing that building codes, while they show a healthy level of savings, do not directly contribute to reducing commercial energy use in absolute terms. Because they affect primarily new buildings, their main value is to limit the growth in energy use from new development. Therefore, the 5% savings attributed to codes in Figure 31 cannot be shown as contributing to the 25% goal. Rather, codes help keep the 25% goal from becoming a 30% or 40% goal based on uncontrolled growth in energy demand from new construction.

**Figure 31. Comparison of Mid-Range Potential Policy Impacts**

<b>Policy Category</b>	<b>Potential Savings</b>	<b>Assumptions</b>
Mandatory RCx/audits	5%	10% average savings per building
Maximum building codes	5%	45% more stringent than current code; 1.7% growth scenario
Mandatory Retrofits	4%	Lighting measures only: interior, exterior, including parking lots
Mandatory benchmarking	2%	5% average savings per building
Community Challenge	2%	33% of office space participates, savings average 20%/building
Financing/tax credits	0.5%	County efforts cause 25% increase in utility program impacts

Based on these caveats, Figure 31 is useful primarily for comparative and indicative purposes. It should not be used to make hard estimates of impacts. Within these limits, however, Figure 31 does indicate that policies can help achieve significant portions of the 25% goal. This suggests that some of these policies are worth pursuing. These results also suggest that no one policy is capable of delivering the savings needed to come close to the County's 25% savings goals. They suggest, rather, that a suite of policies, designed to complement each other, would be the preferred path to realizing the goal.

## **2.12 Economic Considerations for Policy Scenarios**

This Study is not driven primarily by cost-effectiveness considerations, unlike a typical utility-sector potential study, which rarely focuses on technical potential and usually concentrates on economic potential. These issues were discussed at length in the background section earlier in this report. Nonetheless, economic issues will come into play as part of the policy discussion, and so ICF developed some basic cost estimates for use in the County's efforts going forward.

Economic assessments of energy savings involve three main components: the costs of installing the measures, the value of the energy savings benefits, and the administrative costs of implementing the policy or program. The last component, which would be the County's and stakeholders' costs of implementing and complying with/participating in policies and programs, is addressed in the policy descriptions in subsequent sections. This section addresses only the costs of the measures themselves, and the value of the energy savings they produce.

On the cost side, there are two bases for estimating costs: a full-cost basis, and an incremental-cost basis (also referred to as Replace on Burn-out). The full-cost basis is typically used in cases where measures are installed in elective-retrofit situations, where the existing equipment does not need replacement. The incremental-cost basis is typically used in cases where measures are installed when existing equipment fails or otherwise needs replacement. Incremental costs are usually much lower than full costs; for example, an efficient residential-size air conditioning unit

might cost \$3,000 to install on a full-cost basis, but only a few hundred dollars on an incremental-cost basis. It is almost always easier for measures to pass economic tests on an incremental-cost than on a full-cost basis, the exception typically being low-cost, fast-payback measures such as lighting retrofits.

Figures 32 and 33 summarize an aggregate assessment of benefits and costs for the measures included in the technical potential analysis. Figure 32 includes the full installed cost of the measures, while Figure 33 includes the incremental costs. In both Figures, cost-effectiveness is measured by a Participant Test. The Participant Test simply compares the individual building owner's costs to the value of the energy savings, where savings are valued based on retail energy prices as paid by the building occupant. A PCT score, the ratio of benefits to costs, of 1 or greater signifies that the measure is cost-effective.

The PCT is an appropriate way to assess whether measures are cost-effective from the viewpoint of an individual building owner. In utility program circles, the most common test used is the Total Resource Cost (TRC) test. The main difference between TRC and PCT is that TRC values savings based on "avoided costs", a term defined rather narrowly in utility economics to represent the energy and capacity costs that a utility system would avoid in not having to build new facilities. This Study uses the PCT as most applicable to the average building owner. However, the County or other stakeholders may choose to apply other economic tests for other purposes.

These two figures indicate that as a whole, the measures that make up the full technical potential are only cost-effective on an incremental basis. For comparative purposes, the simple paybacks on a full-cost basis range from 23 to 92 years, whereas on an incremental-cost basis, payback ranges from 5 to 8 years.

**Figure 32. Costs, Benefits, and Participant Test Results for Aggregate Efficiency Measures (Full Installed Cost Basis)**

<b>Commercial Buildings</b>			
<b>Discount Rate</b>	<b>Full Installed Costs (\$M)</b>	<b>Lifetime Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$7,497	\$697	0.09
7.50%	\$7,497	\$599	0.08
10%	\$7,497	\$522	0.07
<b>Multifamily Buildings</b>			
<b>Discount Rate</b>	<b>Full Installed Cost (\$M)</b>	<b>Lifetime Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$1,180	\$562	0.48
7.50%	\$1,180	\$469	0.40
10%	\$1,180	\$398	0.34

\*Savings over the life of the measure, discounted to present value

\*\*A score of 1.0 or greater indicates cost-effectiveness over the lifetime of the measure

**Figure 33. Costs, Benefits, and Participant Test Results for Aggregate Efficiency Measures (Incremental Cost Basis)**

<b>Commercial Buildings</b>			
<b>Discount Rate</b>	<b>Incremental Costs (\$M)</b>	<b>Value of Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$297	\$428	1.38
7.50%	\$297	\$373	1.21
10%	\$297	\$329	1.07
<b>Multifamily Buildings</b>			
<b>Discount Rate</b>	<b>Incremental Costs (\$M)</b>	<b>Value of Energy Savings (\$M)*</b>	<b>PCT Test Scores**</b>
5%	\$285	\$335	1.18
7.50%	\$285	\$282	0.99
10%	\$285	\$242	0.85

\*Savings over the life of the measure, discounted to present value

\*\*A score of 1.0 or greater indicates cost-effectiveness over the lifetime of the measure

Cost-effectiveness does not in and of itself indicate that the market will adopt all of the measures that pass a PCT or a TRC test. Market barriers, as discussed elsewhere in this report, can severely limit the ability to achieve a high fraction of efficiency potential. Policy and program action is thus typically required to drive markets toward accelerated and broader adoption of efficiency technologies and practices.

## 3.0 Policy/Program Development

This Study examines ten policies and programs that could help the County meet its Climate Protection Plan goal of reducing commercial building energy use by 25 percent by 2020. Some contain mandatory requirements; others are more voluntary, providing incentives, information, or services. The policies and programs generally can be applied to existing and new commercial buildings; ICF has noted the cases in which a policy or program applies exclusively to existing buildings or new construction.

The ten policies and programs align with two broad categories: those that drive demand for energy efficiency through increased energy use awareness and upgrade requirements and those that enable investment in energy efficiency through financial and procedural mechanisms. The policies and programs are listed by category below and discussed in more detail in the pages that follow.

### **Driving Demand for Energy Efficiency**

1. Community Energy Challenge
2. Energy Performance Benchmarking and Disclosure
3. Energy Assessment and Retro-Commissioning
4. Building Energy Codes (*new construction and major renovation*)
5. Building Energy Retrofit Requirements

### **Enabling Investment in Energy Efficiency**

6. Energy Efficiency Tax Credit
7. Property-Assessed Clean Energy Financing
8. On-Bill Financing
9. Energy-Efficient Leasing
10. Energy Efficiency Rebate and Grant Programs

While each of the policies and programs in this report are described individually and therefore could be viewed as standalone policy options, combining or linking policies in a broader portfolio can also make sense. In this context, the first program discussed—a Community Energy Challenge—can provide an umbrella for other voluntary and mandatory initiatives. This linking strategy is noted where applicable throughout the policy/program descriptions.

## **Driving Demand for Energy Efficiency**

### **3.1 Community Energy Challenge**

The County could create a voluntary energy challenge, inviting property owners, managers and occupants to create strategic energy management programs that help their organizations reach a long-term energy-savings target that aligns with the County's 2020 goal to reduce commercial building energy use by 25 percent. The current Montgomery County Green Business Certification program provides a potential framework for such an initiative. Challenge participants would measure their progress towards interim, possibly annual, energy-savings goals to help ensure continuous energy savings and build momentum towards the 2020 target.

Benchmarking with the U.S. Environmental Protection Agency's (EPA) energy measurement and tracking tool, Portfolio Manager,<sup>8</sup> would be required to establish a baseline and measure progress. The County would provide recognition and support in the form of technical or financial assistance, drawing on resources offered by utilities and energy service providers in the community, thereby stimulating the creation of local green jobs and energy efficiency investment. The Community Challenge could employ social marketing strategies as well as an annual or other reoccurring awards ceremony to recognize participants and their service providers who achieve the largest absolute energy reduction or percentage-based performance improvement, among other categories. The experience of the federal ENERGY STAR program is that thousands of business partners have been willing to make substantial commitments to gain such recognition.

This model also aligns with the U.S. Department of Energy's (DOE) Better Buildings Challenge,<sup>9</sup> which encourages participants to achieve a 20 percent energy use reduction by 2020 and provides resources to help participants develop energy action plans, access technical and financial assistance resources, and report program progress using Portfolio Manager or similar tools.

The Community Challenge model can build on best practices in energy management today, which revolve not only around technology investments, but about organizational change that creates a culture of continuous energy improvement. Some organizations have established such cultures and practices around safety; energy performance can be treated similarly. The Community Energy Challenge would expand this organizational culture approach into the realm of civic values. Every community has priority issues such as traffic calming, sidewalk construction, or tree planting. Energy performance can become another. This approach has intrinsic rewards in that building owners see the benefits directly in lower energy bills, and it also can create wider benefits for the County in shaping its image as an affordable and sustainable place to live and work.

### ***Policy/Program Approach***

Community Energy Challenges across the country, including nearby Arlington County's Green Games,<sup>10</sup> have followed the Green Business Challenge program model developed by ICLEI-Local Governments for Sustainability.<sup>11</sup> Key design features for the County to consider include:

- **Target Audience.** The County may could broadly invite all commercial property owners to join the Challenge, or the County may want to more narrowly target a sub-sector such as office buildings, restaurants, or retail stores. Some programs target larger organizations owning or managing significant amounts of building space, applying the "80-20" rule to reach a larger fraction of the market through a moderate number of participants. However,

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<sup>8</sup> For more information about EPA's Portfolio Manager, visit [www.energystar.gov/benchmark](http://www.energystar.gov/benchmark).

<sup>9</sup> For more information about DOE's Better Buildings Challenge, visit [www4.eere.energy.gov/challenge/](http://www4.eere.energy.gov/challenge/).

<sup>10</sup> For more information about Arlington County's Green Games, visit [www.arlingtongreengames.com/](http://www.arlingtongreengames.com/).

<sup>11</sup> For more information about ICLEI's Green Business Challenge program model, visit [www.iclei.org/climate\\_and\\_energy/climate\\_mitigation\\_guidance/green-business-challenge](http://www.iclei.org/climate_and_energy/climate_mitigation_guidance/green-business-challenge).

smaller organizations may be motivated, capable, and desirous of recognition, so the County will want to assess stakeholder interest as part of the program design process.

Based on the fact that offices and retail space account for the great majority of the County's buildings energy and carbon footprint, the County could maximize its investment by targeting these sectors. The office-space focus is also consistent with the current County Green Business Certification program. Arlington County has used a similar strategy in recruiting office building owners and tenants in its first program year. It later expanded to include a campaign to encourage retailers to keep their doors closed when heating or cooling their stores. Arlington County is now developing a more comprehensive program for retail stores and restaurants and will add additional sectors as resources allow. Similarly, the County may want to use the dual-track model offered by ICLEI so that building owners and managers and tenants can participate in ways that align with their decision-making abilities and access to energy data. For example, for commercial office buildings, the County could work with building owners/managers to set energy reduction goals and provide technical and financial assistance to help make energy efficiency improvements to lower energy consumption towards their goals. For tenants, the County would provide resources to stimulate energy-efficient behavior that would support building-wide energy reduction goals and provide assistance in working with building owners and managers to collaboratively achieve energy savings and other environmental goals. For example, the County could provide lease language that would enable building owners and tenants to share in energy efficiency upgrade costs and cost savings, or provide training in setting up an employee green team. Building owners/managers and tenants would earn points for their respective contributions to energy performance improvement, with the Green Business Certification framework or as an independent initiative.

- **Target Goals.** The County could encourage Challenge participants to align their goals with the County's 25 percent energy reduction by 2020 goal, which would also support building owners' and the County's participation in DOE's Better Buildings Challenge, which has a slightly less aggressive goal of 20 percent energy savings by 2020. Additional environmental goals could tie in with other County initiatives, such as the existing Green Business Certification program. In a Green Business Certification framework, participants in a voluntary energy savings challenge could gain certification by committing to and demonstrating progress toward aggressive savings goals.
- **Target Area.** The County may choose to focus participation in concentrated development areas, possibly in partnership with appropriate Bethesda, Rockville, Silver Spring, or Wheaton organizations or allow countywide participation. For example, the Cities of Atlanta and Chicago chose to target their central business district; whereas, Arlington County and Westchester County, New York, have opened the competition to all eligible businesses within their borders. It may be prudent for Montgomery County to concentrate its resources, especially if coupled with those of other local governments, rather than spread itself too thin and dilute the impact of the Community Challenge call to action.

The County's role in mounting a leadership challenge could include:

- Establishing the program framework and reporting infrastructure
- Educating potential participants (e.g., building owners/manager, tenants) and program partners (e.g., utilities, energy and financial services companies) about the program

- Working with area utilities and energy services companies to provide guidance on setting up an organizational energy management program for participants
- Offering technical assistance on the reporting tools and other program resources
- Facilitating peer-to-peer information exchange and networking among Challenge participants, trade allies, vendors, and other stakeholders
- Linking Challenge participants with available financial (e.g., utility rebates, state grants, County tax credits, private sector financing) and technical assistance (e.g., utility-provided energy usage data, Portfolio Manager training) resources
- Recognizing program participants through press events with local officials, an awards ceremony, and other media attention

### ***Implementation Strategies***

A Community Energy Challenge can serve as an outreach and engagement strategy for a number of different policies. It can provide a voluntary “carrot” approach to balance the “stick” of regulatory policies. For example, if the County implements a mandatory benchmarking and disclosure policy, a Community Challenge could provide motivation and support for using benchmarking data to drive energy performance improvement. A Community Challenge can also be an effective way to increase participation in other voluntary programs. For example, a challenge could help expand the reach of local electric utility incentive programs, increase the use of County-endorsed financing options, and stimulate interest in the County’s Green Business Certification Program.

To ensure the long-term sustainability of a Community Energy Challenge, the County may wish to consider the following options:

- **Phased approach-** Other challenges often initially target owners/managers and tenants of larger office buildings and may phase in other sectors after the first program year. Montgomery County could use this same phased approach to start with businesses that own and/or manage large office and retail buildings that are already eligible to participate in the County’s Green Business Certification Program and later incorporate challenge opportunities for multifamily, healthcare, hospitality, or faith-based organizations.
- **Targeted Outreach and Education-** Best practices in this area typically fall in three categories: training, educational materials, and peer-to-peer exchange among program participants. For example, Arlington County facilitates the sharing of best practices and lessons learned among participants by holding in-person monthly trainings and online webinars to encourage the development of peer and expert support networks. These trainings include “Mingling Mondays,” a monthly breakfast networking event; “Timeout Tuesdays,” a monthly expert brown bag lunch series; and “Webinar Wednesdays,” two monthly hour-long live webinars. Resources would have to be found to support the costs of such events; one possibility would be to assess whether service providers would be able to support such efforts. Atlanta is also planning to use challenge participant success stories to share best practices throughout the community and with DOE Better Buildings Challenge participants nationwide.<sup>12</sup>

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<sup>12</sup> For more information about Atlanta’s Better Buildings Challenge, visit <http://www.atlantabbc.com/>.

- **Partnerships-** Many Community Energy Challenges have benefited from their partnerships with local businesses, universities, utilities, and other community and national organizations. For example, Denver is tapping into expert resources through its local utility, Xcel Energy; the local Building Owners and Managers Association chapter; and EPA to provide training and outreach.<sup>13</sup> Denver also relies on Xcel Energy to provide financial incentives and access to energy services companies to complete energy assessments and make recommended energy efficiency upgrades in support of challenge goals. The County may also look for challenge sponsors to help defray costs for awards, events, printing, or product giveaways in exchange for recognition opportunities. As an ENERGY STAR® partner, Montgomery County can access free resources from EPA. EPA offers a Build Your Own Challenge toolkit with step-by-step guidance, ENERGY STAR resources, and case studies.<sup>14</sup> Should the County decide to rejoin ICLEI, its Green Business Challenge Guidebook and online resource kit contains administrative tools, templates, marketing materials, case studies, and presentations to help build a community challenge.<sup>15</sup> ICLEI has also developed an online portal to streamline participant data collection and management.

### ***Target Audience and Key Stakeholders***

Montgomery County would engage the following stakeholders to compete in and support the Challenge:

- Building owners/managers and tenants could help inform program design, participate in the challenge, and promote participation among others.
- Elected officials could provide the call-to-action for businesses to participate and provide recognition opportunities.
- Media could help promote the challenge and provide recognition opportunities.
- Associations and related groups that represent property managers, real estate professionals, tenants, and energy service providers could help promote the program and educate stakeholders.
- Utility companies could provide technical and financial assistance, provide access to energy usage data, and promote the program to customers.
- Energy service providers could help building owners and manager identify and implement energy efficiency opportunities to help meet their energy-savings goals.
- Challenge sponsors could help by covering costs for awards, events, food, printing, or product giveaways in exchange for opportunities for recognition.

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<sup>13</sup> For more information about Denver's energy challenge initiatives, visit <http://www.denvergov.org/mayor/MayorsOffice/ProgramsInitiatives/BetterBuildingsDenver/tabid/442894/Default.aspx>.

<sup>14</sup> For more information about EPA's Building Your Own Challenge toolkit, visit [http://www.energystar.gov/index.cfm?fuseaction=challenge\\_community.showIntroduction](http://www.energystar.gov/index.cfm?fuseaction=challenge_community.showIntroduction).

<sup>15</sup> [www.iclei.usa.org/climate\\_and\\_energy/climate\\_mitigation\\_guidance/green-business-challenge](http://www.iclei.usa.org/climate_and_energy/climate_mitigation_guidance/green-business-challenge)

## ***Performance Measurement.***

Potential performance measures to track include:

- Number and percent of buildings that participate
- Number and types of sectors represented by program participants
- Number and types of program partners (non-participants)
- Absolute and percent energy savings per participant and overall
- Absolute and percent savings of other resources (e.g., water, waste) and greenhouse gas emissions per participant and overall
- Number of earned media hits

## ***Benefits and Costs***

### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** The Challenge would reduce energy use through technology investments and behavior change that combine to drive improved building energy performance. Arlington County's Green Games program asked building owners to commit to energy savings goals in the 10 percent to 30 percent range. The DOE Better Buildings Challenge asks participants to achieve a 20 percent reduction in building energy use. If buildings achieve ENERGY STAR labeled status; this can translate to 35 percent energy savings for typical buildings.<sup>16</sup>
- **Energy Cost Savings-** Energy savings and reduction in operation cost will equate to on-going cost savings for tenants and owners/managers. In its first year, the Chicago Green Office Challenge engaged more than 150 companies and produced savings of more than \$5 million for participants.<sup>17</sup>
- **Increased Property Value-** Buildings that increase their operating efficiency as a result of participating in the challenge can experience increased occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>18,19,20,21</sup> These benefits flow not only to building

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<sup>16</sup> EPA, "Apply for the ENERGY STAR for Your Buildings."

[http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager\\_intro](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_intro).

<sup>17</sup> ICLEI-Local Governments for Sustainability, *The Green Business Challenge Guidebook*, December 2010.

<sup>18</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, EPA 430-S-06-003, February 2006.

[http://www.energystar.gov/ia/partners/publications/pubdocs/Summary\\_of\\_the\\_Financial\\_Benefits\\_23June06\\_FINAL.pdf](http://www.energystar.gov/ia/partners/publications/pubdocs/Summary_of_the_Financial_Benefits_23June06_FINAL.pdf).

<sup>19</sup> Institute for Market Transformation (IMT). "Energy Efficiency and Property Value." <http://www.imt.org/rating-value.html>.

<sup>20</sup> David Pogue, Charles Tu, and Harvey Bernstein. "Do Green Buildings Make Dollars & Sense? An analysis of operating costs, worker productivity and the benefits of LEED® certification in a commercial office portfolio, Green Building Study, ver. 2.0."

<http://marketing.cbre.com/Sustainability/GreenBuildingStudy/DoGreenBuildingsMakeDollarsAndSense.pdf>.

<sup>21</sup> James Finlay and Nils Kok, "Valuing Sustainable Real Estate," June 2011.

<http://marketing.cbre.com/NewportBeach/Sustainability/ValuingSustainableRealEstate.pdf>.

owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options-** More staff time is required during ramp-up; however, dedicated staff and funding is required throughout the program to engage stakeholders, host events, maintain a program website, and develop marketing pieces. ICLEI estimates annual program administration costs from \$50,000 to \$150,000 using 0.75 to 2 full-time equivalents.<sup>22</sup> The first year of the Chicago Green Office Challenge was within this range, costing roughly \$94,000 for salaries and benefits (\$73,000), supplies (\$100), website hosting (\$1,000), postage and shipping (\$100), and events (including the program kickoff event and awards ceremony - \$20,000) and meetings.<sup>23</sup> Arlington County budgeted approximately \$400,000 to provide staff compensation and cover marketing expenses, such as website design and development and marketing pieces, for the first two years of the Arlington Green Games.<sup>24</sup> The County can help keep costs down by leveraging existing templates and examples provided by ICLEI, EPA, DOE, and other communities with existing challenges.

### ***Communities with Similar Policies/Programs***

- Arlington County, Virginia, Arlington Green Games: Launched in 2010, this nearby challenge invites participants to set energy, water, and waste reduction goals using a two-track building owner/manager and tenant approach. The program initially targeted office buildings, but is being expanded to include a retailer and restaurant component. Other sectors may be added as resources allow. <http://www.arlingtongreengames.com/>
- Atlanta, Georgia, Atlanta Better Buildings Challenge: Launched in 2011, Atlanta is using DOE's Better Buildings Challenge to inspire energy and water savings at the local level. The challenge is initially targeting Atlanta's central business district, which includes the Atlanta Civic Center and other municipal facilities to lead by example. <http://www.atlantabbc.com/>
- Boulder, Colorado, 10 for Change Challenge: Launched in 2008, Boulder offered one of the first challenge models. The program was designed to encourage area businesses to help Boulder meet its greenhouse gas reduction goals through voluntary sustainability measures, including integrating energy-efficient technologies and practices. The challenge includes City and utility (Xcel Energy) sponsored energy audits; site visits of leading participating businesses to promote peer exchange; and integration with City-, State-, and utility-offered incentives. A recent analysis of Boulder's energy efficiency and renewable energy programs found the 10 for Change Challenge to be the most cost-effective commercial program (\$41/metric ton CO<sub>2</sub>-equivalents reduced compared to an average of \$130/metric ton CO<sub>2</sub>-

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<sup>22</sup> ICLEI, *The Green Business Challenge Guidebook*, 2010.

<sup>23</sup> Gallardo, Bryan, Mayor's Office, City of Chicago, e-mail message to Zach Abrams, May 11, 2011.

<sup>24</sup> John Morrill, Energy Manager, Arlington County, e-mail message to Leigh-Golding DeSantis, April 26, 2011.

equivalents reduced).<sup>25</sup> Boulder is considering transitioning the program from a voluntary initiative to a mandatory program. <http://www.10forchange.net/>

- Chicago, Illinois, Chicago Green Office Challenge: Launched in 2009, this challenge was developed in partnership with ICLEI and provides the foundation upon which many other community challenges have been modeled. It uses a two-track building owner/manager and tenant approach and targets downtown office buildings. <http://www.chicagogreenofficechallenge.org/>
- Denver, Colorado, Denver Energy Challenge: Launched in 2012, Denver is also using DOE's Better Buildings Challenge to encourage 20 percent energy savings by 2020. The program builds on a previous Denver Watts to Water Challenge that was supported by the City and County of Denver, Xcel Energy, EPA, and others. The challenge is open to local businesses and residents. <http://www.denverenergy.org/business>
- Westchester County, New York, Westchester Green Business Challenge: Launched in 2009, this challenge is offered in partnership with Westchester County, New York and the Business Council of Westchester. The program is open to all businesses within the county. Participants' sustainability, including energy performance, is evaluated using a green business scorecard that provides points for up to 82 unique strategies. [http://climatechange.westchestergov.com/index.php?option=com\\_content&task=view&id=2571&Itemid=4597](http://climatechange.westchestergov.com/index.php?option=com_content&task=view&id=2571&Itemid=4597)

EPA's ENERGY STAR Program also offers an Energy Challenge model: more information can be found at [http://www.energystar.gov/index.cfm?c=challenge.bus\\_challenge](http://www.energystar.gov/index.cfm?c=challenge.bus_challenge).

### 3.2 Energy Performance Benchmarking and Disclosure

This policy would require benchmarking and disclosure of energy performance information for existing buildings with floor area above a certain size (minimum sizes typically range from 10,000 to 50,000 sq. ft. ), including public buildings. Energy performance benchmarking employs a "yardstick" to measure a building's energy performance, typically by tracking a building's energy use per ft<sup>2</sup>. This number is then compared to that of similar properties or to the building's own performance over time. The requirement to benchmark and report performance data would be implemented on a staggered schedule based on building size. Benchmarking would be required at least once per year, with results submitted annually, and can be disclosed publically via a website.

The intent of this policy is to make energy performance more visible in the marketplace, making building owners, managers, tenants, and the public more aware of this important indicator of environmental protection. Furthermore, it is anticipated that public disclosure of benchmarking data will increase demand for energy-efficient buildings and would encourage building owners to upgrade their properties to be more competitive.

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<sup>25</sup> Torbert, Roy et al., *City of Boulder Climate Action Plan Analysis Report: Final Report for City of Boulder*, prepared by Rocky Mountain Institute, May 14, 2012. [http://www.bouldercolorado.gov/files/Energy/2012/May22/CAP\\_analysis\\_RMI\\_May14\\_2012.pdf](http://www.bouldercolorado.gov/files/Energy/2012/May22/CAP_analysis_RMI_May14_2012.pdf).

### ***Policy/Program Approach***

Under the proposed policy, building owners would use Portfolio Manager to input energy usage data and calculate energy benchmarking data for their properties. Portfolio Manager is widely used and accepted across the public and private building sectors, and all existing state and local benchmarking policies across the country have specified Portfolio Manager. This tool is available to all users for free via the Internet.

All commercial and multifamily buildings can be benchmarked in Portfolio Manager and can receive key energy performance metrics including total annual energy use and weather-normalized energy use per square foot for the building. For 15 building types, Portfolio Manager also generates a score from 1 to 100. This score allows building owners and managers to compare their property's normalized energy performance to that of similar buildings nationwide. For a building to be benchmarked in Portfolio Manager, users must enter basic information about the building, including space use attributes and energy consumption data for the past 12 months. Buildings earning a score of 75 or higher, signifying superior energy performance, are eligible to receive ENERGY STAR certification from EPA. More information on Portfolio Manager and related topics can be found at:

[http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

While final regulations would include more specifics, the proposed approach would include:

**Phased Implementation Schedule** - The County would enact a phased implementation schedule according to building size, as shown in Figure 34 (specific building size thresholds and dates are yet to be determined). Generally speaking, it is expected that owners of larger buildings may already have some familiarity or experience with benchmarking; whereas, owners of smaller buildings may need additional time to become fully educated about benchmarking. It is consistent with other benchmarking and disclosure policies across the country to require compliance by public buildings before requiring private commercial buildings to begin benchmarking. This allows the government body implementing the benchmarking mandate to “lead by example,” which is an important consideration for driving compliance by the commercial sector.

**Public Posting** - The County would build in a delay between the date on which a commercial building must submit benchmarking data to the administering jurisdiction and the date on which benchmarking data are released to the public. This allows time for commercial building owners to improve the performance of their buildings and is consistent with similar policies in other jurisdictions.

**Figure 34. Benchmarking and Disclosure Implementation Schedule**

<b>Property Owner/Size</b>	<b>Benchmarking Deadline (Years from legislative enactment)</b>	<b>Public Disclosure Date (Years from legislative enactment)</b>
County-owned buildings ≥ All Eligible	1	1
Privately owned buildings ≥ 200,000 ft <sup>2</sup>	2	3
Privately owned buildings ≥ 100,000 ft <sup>2</sup>	3	4
Privately owned buildings ≥ 50,000 ft <sup>2</sup>	4	5

- **Reporting Requirements** - The County could establish a reporting system and protocol to allow covered building owners to demonstrate compliance and share benchmarking data with the County. This reporting system could then be used to populate a publicly viewable web page containing benchmarking data. By way of this database, benchmarking data would be available to real estate agents and multiple listing services (e.g., CoStar), prospective renters/buyers, as well as the general public. Using Portfolio Manager, it is possible for the County to define a custom reporting template that could be released to all covered building owners. By clicking on a link, the building owner would be taken to the Portfolio Manager custom reporting tool, where they could populate the pre-defined fields with data from their covered building(s) and release this information to the County. This approach has been used by numerous jurisdictions with benchmarking mandates, including New York City, San Francisco, and Austin.<sup>26</sup> The County should also seek to learn from and improve upon this experience.
- **Penalties for Non-compliance** - The County would set a schedule of fines at a level that encourages compliance and minimizes the County's collection burden. These fines could be used to fund other proposed programs, such as the Community Energy Challenge.
- **Exemptions** - All buildings would be required to benchmark in Portfolio Manager, including those building types that are not currently able to earn a 1-to-100 score in Portfolio Manager. These properties would be required to submit their weather-normalized energy use intensity (EUI) in lieu of a score. Compliance with the policy will be waived for buildings under 10,000 ft<sup>2</sup>.

### ***Implementation Strategies***

To ensure the long-term success of the policy, the County may wish to consider the following implementation strategies:

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<sup>26</sup> For more information on the structure of benchmarking and disclosure policies nationwide, visit the State and Local Energy Efficiency Action Network's Existing Commercial Buildings Working Group's website: [http://www1.eere.energy.gov/seeaction/existing\\_commercial.html](http://www1.eere.energy.gov/seeaction/existing_commercial.html). The "Key Resources" section of the site includes fact sheets on benchmarking and disclosure considerations for state and local governments and energy efficiency program regulators, as well as a benchmarking and disclosure policy design guide.

- **Utility Coordination.** The County could partner with electric and gas utilities to facilitate the provision of whole-building energy consumption data to covered building owners and managers. This has been critical to the success of the New York City benchmarking mandate, the same California law that required transaction-based benchmarking and disclosure also required utilities to provide a means for delivering whole-building energy consumption data to customers. Utilities can provide this information as a spreadsheet-based download (e.g., Con Edison in New York City)<sup>27</sup> or via EPA’s Automated Benchmarking System (e.g., California investor-owned utilities).<sup>28</sup> Some utilities have charged a per-request fee to provide aggregated energy usage data whereas others have rolled the cost of providing reporting infrastructure and staff time into their existing rates. Building owner compliance can be improved through simplified access to energy usage information from electric and gas utilities to minimize the amount of manual data entry required. Barriers also exist in this area, including utilities’ legal obligation to protect customer privacy, legacy IT issues that complicate electronic data access, and utility regulatory policies in this area.
- **Community Partnerships.** The County may consider coordinating with local and national stakeholders who can help to educate building owners and managers about the policy through trainings and workshops and who can provide benchmarking services to help drive compliance. These actors may include local educational institutions, energy service providers, and industry associations. The involvement of a wide-ranging group of stakeholders who helped to “get the word out” has been cited as a major cause of the greater-than-80-percent-compliance rate with the New York City benchmarking law. Similarly, the County could partner with advocacy organizations and building owner/manager associations to develop case studies demonstrating how a given actor made use of benchmarking data, for example, to identify and prioritize buildings for assessment and upgrade, or as a factor in a real estate purchase or leasing decision. Seattle used this approach in promoting the benefits of benchmarking in compliance with its local policy.<sup>29</sup>
- **Portfolio Approach.** Benchmarking and disclosure requirements form the foundation for energy assessment, retro-commissioning, and retrofit policies and could be packaged to stimulate greater energy efficiency investment. For example, San Francisco couples its energy benchmarking and disclosure ordinance with a requirement to conduct an energy audit of public and private buildings every five years. While results from the San Francisco policy are not yet available, the County may want to track this and similar efforts. Similarly, New York City has implemented a portfolio of energy efficiency policies that include benchmarking, energy assessment retro-commissioning and retrofit requirements. The County could similarly package a portfolio of energy efficiency policies targeting existing commercial buildings. In doing so, benchmarking would be framed as not just a stand-alone analytical exercise, but as a necessary piece of information for building owners to identify and prioritize next steps. Additionally, a Community Energy Challenge could help stimulate compliance with the benchmarking requirement by incorporating elements of competition,

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<sup>27</sup> For more information on Con Edison’s energy data provision approach, visit [http://www.coned.com/energyefficiency/city\\_benchmarking.asp](http://www.coned.com/energyefficiency/city_benchmarking.asp).

<sup>28</sup> For more information on California’s energy data provision approach, visit <http://www.energy.ca.gov/ab1103/>.

<sup>29</sup> For more information about Seattle’s case studies, visit <http://www.seattle.gov/environment/case-studies.htm>.

recognition, and education, all of which are rooted in benchmarking. This may help participating buildings gain more value in benchmarking for internal reasons beyond compliance.

- **Data Standardization, Quality Assurance, and Assessment.** The County could link its reporting system with the Standard Energy Efficiency Data (SEED) Platform under development by DOE to facilitate standardized energy data reporting and comparison across jurisdictions. The County may also wish to track data quality and help users troubleshoot problems through the use of data infrastructure that traps errors in reported data, diagnoses problems, and provides potential solutions. New York City is partnering with local universities to help review and scrub submitted energy performance data.

The following modifications could be made to the benchmarking and disclosure policy as currently described to ease the stringency of the requirements and reward more voluntary action:

- Raise the threshold for minimum building size exemption to minimize the number of buildings and stakeholders required to participate.
- Exempt specific sectors or building types (e.g., those buildings for which the ENERGY STAR 1-to-100 score is not available) to facilitate standard reporting metrics.
- Exempt buildings that have earned ENERGY STAR or LEED certification to encourage voluntary participation in labeling programs that recognize exemplary energy and environmental performance.
- Allow a voluntary compliance window for an initial period (e.g., two years) and then phase in mandatory requirements if a minimum percentage (e.g., 50 percent) of covered buildings do not participate to encourage voluntary action and allow building owners and the energy services industry time to develop benchmarking skills and familiarity.
- Make disclosure transaction-based (i.e., at the time of sale or lease of a building rather than annually) to limit access to benchmarking data to real estate professionals, prospective tenants, financiers, and buyers involved in specific transactions.

### ***Target Audience and Key Stakeholders***

The target audience of the policy may include various subsets of owners and managers of County and privately owned buildings 10,000 ft<sup>2</sup> or larger, as illustrated in the table below.

<b>Sectors Potentially Affected</b>	<b>Number of Buildings</b>	<b>Total Square Footage</b>
County-owned buildings $\geq$ all eligible <sup>30</sup>	247	4,494,585
Privately owned buildings $\geq$ 200,000 ft <sup>2</sup>	115	53,744,946
Privately owned buildings $\geq$ 100,000 ft <sup>2</sup> , < 200,000 ft <sup>2</sup>	249	33,746,885
Privately owned buildings $\geq$ 50,000 ft <sup>2</sup> , < 100,000ft <sup>2</sup>	352	24,817,680

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<sup>30</sup> Includes County Government buildings only. Montgomery County Public Schools Buildings, Montgomery College, and other government operations are not included. It is expected outreach would be done with these agencies to address proposed policies.

Other stakeholders may include the following:

- Interest groups that represent building owners and managers, tenants, and energy service providers could help educate building owners and managers.
- Real estate brokers could play a key role in providing and interpreting energy performance data for tenants and buyers.
- Energy service providers could help building owners and managers comply with the policy and understand their energy efficiency opportunities.
- Utility companies could facilitate access to whole-building energy data necessary for benchmarking in Portfolio Manager and offer technical and financial incentives.

### ***Performance Measurement***

Potential performance measures to track include the following:

- Number and percent of covered buildings that comply with the policy
- Quantity and percent of square footage of covered buildings that comply with the policy
- Descriptive energy performance statistics, including average scores and energy use intensities overall and by building type, location, etc.
- Number of annual visits to the Web site containing benchmarking data
- Number of annual real estate transactions triggering benchmarking and data disclosure (in the case of a transaction-based policy)
- Number of jobs supported by the policy

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use** - Energy performance benchmarking alone does not produce direct energy savings. However, there is a strong body of evidence that suggest that organizations that benchmark are more likely to undertake energy-saving activities than those that do not benchmark. For example, a recent California study found that energy performance benchmarking prompted energy efficiency investment through improved energy management processes (62 percent of sample) and technological and behavioral efficiency projects (84 percent of sample).<sup>31</sup> Furthermore, it was noted that benchmarking encourages more comprehensive retrofits.<sup>32</sup> A national benchmarking and disclosure policy has been estimated to reduce annual energy use by 0.2 quadrillion British thermal units by 2020.<sup>33</sup>

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<sup>31</sup> NMR Group, Inc. and Optimal Energy, Inc., *Statewide Benchmarking Process Evaluation, Volume 1: Report*, April 2012.  
[www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20%28Volume%201%29%20w%20CUC%20Letter%204-11-12.pdf](http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20%28Volume%201%29%20w%20CUC%20Letter%204-11-12.pdf).

<sup>32</sup> Ibid.

<sup>33</sup> Burr, Andrew et al., *Analysis of Job Creation and Energy Cost Savings From Building Energy Rating and Disclosure Policy*, 2012. [http://imt.org/files/Analysis\\_Job\\_Creation.pdf](http://imt.org/files/Analysis_Job_Creation.pdf).

- **Energy Cost Savings** - As with avoided energy use, it is not possible to state that energy performance benchmarking directly drives energy cost savings. However, to the extent that benchmarking results drive building owners and managers to pursue energy efficiency investments, it is expected that energy cost savings would align with energy use reductions. A national benchmarking and disclosure policy could result in annual utility cost savings of \$3.8 billion through 2015 and \$18 billion through 2020.<sup>34</sup>
- **Increased Property Value** - Buildings that have benchmarked their energy performance may be eligible to earn ENERGY STAR, LEED, or other certification. Currently, 40 buildings in the County are LEED-certified, representing about 4% of square footage, and 67 buildings are ENERGY STAR-labeled. In both cases, the majority are office buildings (24 of 40 LEED buildings and 60 of 67 ENERGY STAR buildings). Buildings that have been recognized for their energy performance have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>35,36,37,38</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options** - The County would incur administration costs, including staffing to oversee compliance and data collection, providing education and training on the policy's requirements and benefits, and establishing a reporting infrastructure. In particular, the County will need to develop a database solution for storing, analyzing, and publicizing submitted energy performance data. While there is no systematic or extensive data on costs for implementing benchmarking policies, anecdotal reports suggest that at least one full-time-equivalent staff person is needed to manage such an effort. The Department of Energy is developing a Standardized Energy Efficiency Database (SEED) platform that local governments can use for data management which could help manage costs. Anecdotal experience also suggests that service providers, such as consultants who would provide benchmarking data services for a large part of the market, can help keep public agency costs under control. This suggests that the County would benefit by engaging service providers early in the process.
- The database and reporting costs can be mitigated by leveraging the same infrastructure used for other policies, such as a Community Energy Challenge with a reporting feature. The County may also be able to use DOE's open-source SEED Platform to avoid some of the costs associated with developing the basic building blocks of such a system. The SEED platform will enable local governments to sync their reporting systems using a common framework and taxonomy to facilitate data collection, analysis, and access to end-users through Internet and smart phone applications. The SEED Platform is currently being piloted and is expected to be available nationwide in 2013.

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<sup>34</sup> Ibid.

<sup>35</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>36</sup> IMT, "Energy Efficiency and Property Value."

<sup>37</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>38</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

- Costs related to the training of building owners and managers affected by the policy can also be mitigated by working with trade allies and other actors in the local market to help educate stakeholders. As described above, energy service consultants and related sources of expertise and staff capacity can play key roles in extending County resources.

### ***Communities with Similar Policies/Programs***

Other jurisdictions that have adopted mandatory benchmarking and disclosure policies include the following:

- Austin, Texas, Energy Conservation Audit and Disclosure Ordinance: Austin's policy affects non-residential public and private buildings greater than 10,000 ft<sup>2</sup> and multifamily properties with more than five units using a phased in compliance schedule by sector and building size. Building owners must disclose covered commercial buildings' energy performance scores using Portfolio Manager to the City, buyers, and prospective buyers at the point of sale and to the City annually thereafter. Austin has a non-compliance penalty of a class C misdemeanor with fines up to \$2,000.
- New York City, New York, Local Law No. 84 (part of the Greener, Greater Buildings Plan): New York City's policy affects non-residential and multifamily public buildings larger than 10,000 ft<sup>2</sup> and private buildings larger than 50,000 ft<sup>2</sup>. It requires owners to annually disclose energy and water use intensity, energy performance scores, and a comparison of annual energy and water consumption data to the city using Portfolio Manager (water data required for buildings with automated water meters only). Building tenants are required to disclose energy use to building owners in cases where the owner does not have access to aggregated building energy use. The City discloses annual benchmarking results to the public after the second annual report. Non-compliance is a violation of city construction code, with a potential \$500 quarterly penalty for continued non-compliance.
- San Francisco, California, Commercial Energy Performance Disclosure and Energy Audit Ordinance: San Francisco's policy affects non-residential public and private buildings larger than 10,000 ft<sup>2</sup> and phases in requirements based on building size. Owners must annually file a benchmark report that includes an ENERGY STAR energy performance score (when available), a California-specific energy rating, and EUI. The City discloses annual benchmarking results and audit compliance confirmation to the public after the second annual report. Owners must make an annual benchmarking summary available to tenants, and tenants who are directly metered must make energy use data available to building owners. The policy also requires owners to complete an energy audit every 5 years and file an audit report with the city, showing all retrofit and retro-commissioning opportunities with a simple payback of less than three years. San Francisco issues a non-compliance penalty of \$50 to \$100 a day for a maximum of 25 days.
- Washington, DC, Clean and Affordable Energy Act: The District's policy affects non-residential and multifamily public buildings larger than 10,000 ft<sup>2</sup> and private buildings larger than 50,000 ft<sup>2</sup>. Requirements are phased in based on building size. Building owners must annually disclose an energy performance score to the District using Portfolio Manager. In addition, new buildings must use ENERGY STAR Target Finder, which is similar to Portfolio Manager and enables architects and building owners to set energy performance goals based on model results before buildings are constructed, and disclose results to the district. Non-residential tenants must provide energy consumption and space use information

to building owners to facilitate benchmarking. The District will begin disclosing existing building benchmarking and Target Finder results to the public after the second annual benchmarking report. Several other jurisdictions are also considering this policy approach. For example, a Philadelphia city council member has introduced a bill that would institute a policy similar to those in place in New York and Washington, D.C.

### **3.3 Energy Assessments and Retro-commissioning**

This policy would require existing buildings with floor area above a defined size (policies in place today set thresholds ranging from 10,000 ft<sup>2</sup> or larger) to conduct detailed facility energy efficiency studies every five years, either as retro-commissioning (RCx) projects or as energy assessments (sometimes called audits). Retro-commissioning is designed to diagnose and correct suboptimal performance in building energy systems and can be thought of as a building “tune up.” The intent is to get existing systems working efficiently as designed and maintain their optimal level of performance over time. In this sense, RCx can be thought of as a continuous improvement process.

In contrast to RCx, which looks at the interaction among building energy systems, energy assessments can be targeted to a specific building system (e.g., a lighting audit). An audit can be a one-time event to identify specific energy efficiency upgrade projects (e.g. replacing a chiller, installing occupancy sensors). However, energy assessments work best when coupled with RCx to ensure continuous improvement through prescribed maintenance practices, operator and tenant training, and equipment upgrades as technology advances.

The policy would require the submission of an energy assessment/RCx report that would include recommended energy efficiency measures and the estimated implementation costs; energy and cost savings; and the estimated time for the building owner to recoup its investment through energy cost savings, or the “payback period.” The proposed policy also includes training and certification requirements for energy professionals performing the energy studies, as well as building operators, to expand their energy management skills.

#### ***Policy/Program Approach***

To encourage continued energy efficiency investment in the County’s existing building stock, Montgomery County could introduce mandatory energy assessments and RCx on a staggered five-year cycle. The energy assessment standards would align with ASHRAE’s Procedures for Commercial Building Energy Audits, which defines best practices for energy audits and analysis using a tiered approach (Levels 1 to 3). Retro-commissioning requirements would ensure that covered buildings receive focused analysis, correction, and testing in the following areas: (1) operating protocols, calibration, and sequencing; (2) cleaning and repair; and (3) training and documentation.

A proposed approach could include:

- Phased Implementation Schedule** - The County would lead by example using a phased implementation schedule by building size, as shown in Figure 35. Energy assessments and RCx would be required on a recurring five-year schedule. Because energy assessments are, on average, less expensive per square foot than RCx projects are,<sup>39</sup> the County could require the submission of an energy assessment report first, followed by an RCx report five years later, and then another energy assessment report five years after that, and so on. The County could alternatively require both RCx and audits every ten years as New York City requires; or, the County could schedule both requirements to occur every five years, with provisions that would allow one requirement to be waived if measures were implemented under the other requirement. The County could also lead by example by completing energy assessments and RCx for its public buildings before asking private buildings to follow suit.

**Figure 35. Energy Assessments and RCx Implementation Schedule**

Property Owner/Size	Energy Assessment Report Deadline (Years from Legislation)	RCx Report Deadline (Years from Legislation)
All County-owned buildings	1	2
Privately owned buildings $\geq$ 200,000 ft <sup>2</sup>	2	3
Privately owned buildings $\geq$ 100,000 ft <sup>2</sup>	3	4
Privately owned buildings $\geq$ 50,000 ft <sup>2</sup>	4	5

- Standardized Energy Study Requirements** - The County would align its energy assessment and RCx requirements with national standards to the extent possible and provide a checklist of items with which affected building owners must comply in the absence of national standards. ASHRAE offers a standardized approach to energy assessments, and New York City has developed a list of standard elements that RCx assessments must include to comply with its audit/RCx ordinance.<sup>40</sup>
  - Energy assessment standards would align with ASHRAE's Procedures for Commercial Building Energy Audits, which defines best practices for energy audits and analysis using a scaled approach (Levels 1-3, where Level 1 is a basic walk-through survey and Level 2 and higher is sometimes referred to as an "Investment Grade Audit").
    - Buildings  $\geq$  50,000 ft<sup>2</sup>: Whole-building audit that meets or exceeds ASHRAE Level II.
    - Buildings 10,000 ft<sup>2</sup> to 49,999 ft<sup>2</sup>: Whole-building audit that meets or exceeds ASHRAE Level I.

<sup>39</sup> Hughel, Gregory J., "Commissioning vs. Energy Audits: Making the Best Choice for Your Facility?," *Facility Facts: Facility Engineering Associates Newsletter*, Vol. 17, No. 3, Summer 2009.

<http://www.feapc.com/LinkClick.aspx?fileticket=m6iz5Zg36lw%3D&tabid=67&mid=400>.

<sup>40</sup> For more information about New York City's audit/RCx requirements, visit <http://www.nyc.gov/html/gbee/html/plan/l187.shtml>.

- Retro-commissioning requirements would ensure that the following areas are analyzed and corrected using a checklist approach:
  - Operating protocols, calibration, and sequencing
  - Cleaning and repair
  - Training and documentation
- **Energy Professional Certification Requirements** - The County would work with national and local professional and trade ally groups to set up training, certification, and other credentialing programs to help prepare the workforce to meet the increased demand for energy services resulting from the policy. Existing training and certification programs accepted by utilities and others can be leveraged for this purpose. Energy professionals performing energy assessments or RCx would:
  - Hold third-party credentials (e.g., Association of Energy Engineers Certified Energy Manager, Licensed Professional Engineer).
  - Have minimum years of experience that vary by type of credential held.
- **Energy Assessment/RCx Report Requirements** - The County would establish a reporting system that aligns with that required for other local and national policies and programs (e.g., benchmarking and disclosure, Community Energy Challenge) to the extent possible. Submitted reports must include the recommended and completed energy efficiency measures and the estimated implementation costs, energy and cost savings, and payback period.
- **Penalties for Non-compliance** - The County would set a schedule of fines at a level that encourages compliance and minimizes the County’s collection burden. These fines could be used to fund other proposed programs, such as the Community Energy Challenge.
- **Exemptions** - Compliance with the policy may be waived for covered buildings that have demonstrated one or more of the following within the previous two years:
  - ENERGY STAR certification or achievement of a minimum score in Portfolio Manager with a define time period of the compliance deadline.
  - LEED certification.
  - Demonstration of performance levels equivalent to building energy codes currently in effect; this would require documentation of energy usage data, such as a Portfolio Manager Statement of Energy Performance, and supporting analysis showing calculated energy performance for a code-compliant building of the same type, size, and operating characteristics.
  - The County could make exceptions for financial hardship situations; for example, these might include affordable-housing multifamily properties that lack access to the same sources of capital that market-rate buildings have access to.

### ***Implementation Strategies***

To ensure the long-term success of the policy, the County may wish to consider the following implementation strategies:

- **Portfolio Approach** Energy assessment/RCx policies complement benchmarking requirements. For example, San Francisco couples its energy benchmarking and disclosure ordinance with a requirement to conduct an energy audit of public and private buildings every five years. Similarly, New York City also has a portfolio of energy efficiency policies that include benchmarking, energy assessment/RCx, and retrofit requirements. A leadership

challenge could similarly coordinate with an energy assessment/RCx policy by motivating increased energy performance awareness and improvement.

- **Data Standardization, Quality Assurance, and Analysis** - The County could link its reporting system with that required by a complementary benchmarking and disclosure policy. Both systems could feed into DOE's SEED Platform. The County could track data quality and help users troubleshoot problems through the use of data infrastructure that traps errors in reported data, diagnoses problems, and provides potential solutions. New York City is partnering with local universities to help review submitted energy assessment/RCx findings. The County may also consider sharing the submitted energy assessment/RCx reports with local utilities to help improve the utilities' existing energy efficiency programs and inform future program design.

The following modifications could be made to the energy assessment/RCx policy as currently described to ease the stringency of the requirements and reward more voluntary action:

- Raise the threshold for minimum building size exemption to minimize the number of buildings and stakeholders affected.
- Allow a voluntary compliance window (e.g., two years) before making energy assessments and RCx mandatory to allow the workforce time to develop the necessary skills and earn certification.
- Choose an alternative compliance schedule to reduce the compliance burden:
  - Increase the energy assessment/RCx recurrence interval (e.g., from five years to 10 years)
    - Alternatively, the interval could be reduced (e.g., from five years to three years) to ensure more frequent fine-tuning and upgrades.
  - Require energy assessments or RCx at the point of transaction (e.g., sale, lease) rather than on a recurring schedule.
  - Require energy assessments or RCx when major energy systems (e.g., HVAC, lighting) are replaced rather than on a recurring schedule.
  - Require energy assessments or RCx when a major renovation is conducted rather than on a recurring schedule.
- Reduce or eliminate fines to minimize County resources needed to issue and receive fines and gain increased stakeholder support.
- Modify the list of exemptions to gain increased stakeholder support.

### ***Target Audiences and Key Stakeholders***

The target audience of the policy includes owners and managers of County- and privately owned buildings 10,000 ft<sup>2</sup> or larger in size.

<b>Sectors Affected</b>	<b>Number of Buildings</b>	<b>Total Square Footage</b>
County-owned buildings <sup>≥</sup> all eligible <sup>41</sup>	247	4,494,585
Privately owned buildings <sup>≥</sup> 200,000 ft <sup>2</sup>	115	53,744,946
Privately owned buildings <sup>≥</sup> 100,000 ft <sup>2</sup> , < 200,000 ft <sup>2</sup>	249	33,746,885
Privately owned buildings <sup>≥</sup> 50,000 ft <sup>2</sup> , <100,000ft <sup>2</sup>	352	24,817,680

Other affected stakeholders may include the following:

- Interest groups that represent building owners and managers, tenants, and energy service providers could help educate building owners and managers.
- Energy service providers could help building owners and managers comply with the policy and understand their energy efficiency opportunities.
- Utility companies could provide technical assistance and incentives for identified energy efficiency projects.

### ***Performance Management***

Potential performance measures to track include the following:

- Number and percent of covered buildings that comply with the policy
- Quantity and percent of square footage assessed (as part of an audit or RCx project) to comply with the policy
- Number and types of energy efficiency upgrade projects completed as a result of the policy
- Number and percent of covered buildings that complete energy efficiency upgrade projects as a result of the policy
- Total and percent of covered square footage that complete energy efficiency upgrade projects as a result of the policy
- Number of jobs supported by the policy

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<sup>41</sup> Includes County Government buildings only. Montgomery County Public Schools Buildings, Montgomery College, and other government operations are not included. It is expected outreach would be done with these agencies to address proposed policies.

## ***Benefits and Costs***

### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use** - Savings from energy assessments vary widely based on factors such as the building's size and age or other identified projects. RCx can produce energy savings of 10 percent to 20 percent,<sup>42,43</sup> often through no and low-cost energy efficiency upgrades. Providing building operator and occupant training can further enhance and sustain savings.
- **Energy Cost Savings** - Cost savings from energy assessments and RCx are expected to be in line with energy savings (10 percent to 20 percent for RCx) and can be even greater when factoring in avoided maintenance costs. RCx projects have been found to produce returns on investment exceeding 90 percent with benefit-cost ratios of 4.5.<sup>44</sup> Energy assessments typically generate savings that payback the initial investment in less than one to four years.<sup>45</sup>
- **Increased Property Value** - Buildings that have completed energy efficiency upgrades and improved operating procedures as a result of performing energy assessments and RCx may be eligible to earn ENERGY STAR, LEED, or other certification labels. Buildings that have been recognized for their energy performance have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>46,47,48,49</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options** - RCx can be a highly cost-effective energy and emissions reduction strategy. At a cost typically ranging from \$0.27 to \$0.45 per ft<sup>2</sup><sup>50</sup> (normalized median cost of \$0.30 per ft<sup>2</sup>)<sup>51</sup> typical payback in slightly more than one year<sup>52,53</sup> (normal range of 0.5 to two years).<sup>54</sup> The upfront costs for energy assessments are even lower at \$0.08 to \$0.24 per ft<sup>2</sup>, and typically pay for themselves through energy savings in 0.5 to four years.<sup>55</sup> The County will, however, incur some cost in providing education and

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<sup>42</sup> Mills, Evan, *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*, Lawrence Berkeley National Laboratory, July 21, 2009. <http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-Cost-Benefit.pdf>.

<sup>43</sup> Pikes Research, "Commercial Building Retro-Commissioning Revenue Could Surpass \$1.8 Billion in the United States by 2014," 2011.

<sup>44</sup> Mills, *Building Commissioning: A Golden Opportunity*, 2009.

<sup>45</sup> Hughel, "Commissioning vs. Energy Audits," 2009.

<sup>46</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>47</sup> IMT, "Energy Efficiency and Property Value."

<sup>48</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>49</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

<sup>50</sup> Hughel, "Commissioning vs. Energy Audits," 2009.

<sup>51</sup> Mills, *Building Commissioning: A Golden Opportunity*, 2009.

<sup>52</sup> Ibid.

<sup>53</sup> Pikes Research, "Commercial Building Retro-Commissioning Revenue Could Surpass \$1.8 Billion," 2011.

<sup>54</sup> Hughel, "Commissioning vs. Energy Audits," 2009.

<sup>55</sup> Ibid.

training on the policy's requirements and establishing a reporting infrastructure. These costs can be mitigated by leveraging the same infrastructure used for other policies, such as benchmarking and disclosure or a leadership challenge with a reporting feature. The County may also be able to use DOE's open-source SEED Platform to avoid some of the costs associated with developing the basic building blocks of such a system.

- **Other Considerations** - RCx, in addition to being a proven energy-saving practice, can also be seen as risk mitigation measure. It ensures that building owners get the full value of the buildings that they pay for by correcting systems to work as originally designed and helps to avoid unnecessary energy and maintenance expenses and other potential safety issues.<sup>56</sup> Recurring audits and RCx can also help the County deliver on its energy and greenhouse gas reduction targets by sustaining energy savings gained from other energy efficiency measures.

### *Communities with Similar Policies/Programs*

Other jurisdictions that have adopted mandatory energy assessment and RCx policies include the following:

- New York City, New York, Local Law No. 87 (part of the Greener, Greater Buildings Plan): New York City requires covered buildings to undergo an energy audit and RCx every 10 years by a certified professional. Audits must meet ASHRAE Level 2 energy survey and analysis requirements, while RCx assessments must include a checklist of study items.
- San Francisco, California, Commercial Energy Performance Disclosure and Energy Audit Ordinance: San Francisco requires covered buildings to receive an energy audit every five years and building owners/managers to measure and disclose energy performance using Portfolio Manager annually. The stringency of audit requirements varies based on building size; audits must be completed by certified professionals.

### **3.4 Building Energy Codes and Upgrades**

Building energy codes mandate a baseline level of energy performance for new buildings. Upgrading Montgomery County's building codes beyond what is required by Maryland State Law will increase the stringency of energy efficiency requirements applied to new buildings, large additions, and major renovations. Two distinct policies will raise the efficiency of Montgomery County buildings through policy and practice.

First, the County would review and consider adoption of an advanced green building code or energy "stretch" code, such as the International Green Construction Code (IGCC) 2012 or a more stringent amendment to the International Energy Conservation Code (IECC) 2012, such as the New Buildings Institute's (NBI) Core Performance supplement, to apply to all commercial and multifamily residential buildings greater than or equal to 10,000 ft<sup>2</sup>.

Second, the county would establish a program to evaluate and improve code compliance. This policy would provide a structure for qualitative and quantitative evaluation of the rates of compliance with established energy and green construction codes. The discussion later in this

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<sup>56</sup> Mills, *Building Commissioning: A Golden Opportunity*, 2009.

section further explores compliance rates. Evaluation will provide a baseline of and identify barriers to compliance; this information will inform a County program to set goals and increase compliance with energy and green building codes. The program can incorporate special enforcement, incentives, outreach, and training to maximize the effectiveness of current and future energy and green construction codes.

### ***Policy/Program Approach***

Montgomery County and the State of Maryland consistently adopt the most up-to-date national model commercial building energy codes. The state adopted the 2012 family of International Code Council (ICC) codes, including the IECC, as of January 1, 2012. Local jurisdictions are required to adopt the 2012 ICC codes, with local amendments,<sup>57</sup> by July 1, 2012. It is assumed that Montgomery County will adopt a local version of the 2012 codes, which serve as the baseline for this recommended policy.

Building energy codes can provide Montgomery County with additional energy savings and increased commercial building performance through a two-pronged policy approach: 1) adopt a more rigorous commercial building code that focuses on energy and green construction requirements, and 2) increase the impact of current and future building energy codes.

Adoption of advanced energy or green building codes would promote better environmental and energy performance in buildings. Maryland state law enables local jurisdictions to adopt and amend the IGCC as an overlay code or make local amendments to the 2012 IECC and enforce either as code. Commonly, jurisdictions that adopt a stronger energy code either 1) require a performance improvement above the energy code in force (e.g., compliance with the NBI's Core Performance supplement or the ASHRAE Advanced Energy Design Guide) or 2) require certification via a third-party rating system such as ENERGY STAR, LEED, residential-specific systems such as Home Performance with ENERGY STAR or Home Energy Rating System (HERS), or locally developed rating systems.

When evaluating a more stringent code for adoption, Montgomery County should consider whether 1) requiring a performance improvement above the Maryland State Code (IECC 2012) or 2) a holistic green building overlay code, such as the IGCC or rating system, best serves the environmental, economic, and energy goals of the County. An IECC amendment would focus primarily on energy, while a green building code would address a broader range of environmental impacts.

Additionally, the County should consider the relative burden of enforcement and the number of buildings that can be covered by a mandatory code when selecting between adopting a standard written as code versus a standard written as a voluntary rating system. In some cases, adopting the IGCC, the Core Performance supplement, or other IECC-based code or package of amendments is the most cost-effective mandate for code officials and builders. For example, the

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<sup>57</sup> Note, per Maryland state code, local jurisdictions may not lessen the requirements of the IECC via adoption of amendments.

IGCC is fairly customizable to local priorities and capacity, allowing creation of a code that is adaptable and more easily enforced, while the Core Performance supplement can be adopted verbatim as an amendment to the IECC. These codes can be complemented with a voluntary incentive-driven rating system program.

By adopting the most up-to-date commercial codes, Montgomery County is already expected to realize improvements in building performance even if advanced codes are not adopted. However, there can be a significant gap between projected and actual energy savings. Studies have shown typical energy code compliance rates to be between 40 to 60 percent around the Country. Common reasons for low compliance include:

- Restrictions in code office staffing or funding.
- Prioritizing life safety and public health over energy and emissions due to time and funding restraints.
- Lack of awareness among developers, architects, and builders.
- Disconnect between costs of ownership and costs of construction for lenders, builders, owners, developers, and tenants (“split incentives”).<sup>58</sup>
- On-site changes to approved plans or building materials.<sup>59</sup>

The Department of Energy has developed one state-level protocol<sup>60</sup> for evaluating energy code compliance, which involves the following:

- A statistical sampling of buildings in each category (for example, commercial new construction and major renovations) at various sizes
- On-site inspections using a checklist
- Aggregation of sample data and identification of trends

Buildings may comply with the building energy code by following a prescriptive path or via actual building performance. The protocol also describes other methods of verifying compliance, such as surveys, self-assessments, or spot checks.

Gathering data related to compliance rates can identify barriers to compliance, classify specific audiences in need of training or outreach (e.g., developers of small projects), help the County select appropriate compliance goals (e.g., reaching 85 percent compliance with the current code by a certain year), and provide support for securing additional staff time. While final regulations would include more specifics, the proposed approach would include:

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<sup>58</sup> Northeast Energy Efficiency Partnerships, *Enhancing Code Compliance with Third Party Energy Specialists*, March 29, 2012.

[http://neep.org/uploads/NEEPResources/id772/RI%20Third%20Party%20Inspection%20White%20Paper\\_March\\_2012.pdf](http://neep.org/uploads/NEEPResources/id772/RI%20Third%20Party%20Inspection%20White%20Paper_March_2012.pdf).

<sup>59</sup> American Council for an Energy-Efficient Economy (ACEEE), *Lessons Learned from Building Energy Code Compliance and Enforcement Evaluation Studies*, 2010.

[http://www.aceee.org/sites/default/files/publications/proceedings/SS10\\_Panel8\\_Paper27.pdf](http://www.aceee.org/sites/default/files/publications/proceedings/SS10_Panel8_Paper27.pdf).

<sup>60</sup> DOE, *Measuring State Energy Code Compliance*, March 2010.

<http://www.energycodes.gov/arra/documents/MeasuringStateCompliance.pdf>.

- **Advanced Energy Efficiency or Green Building Codes** - The County could adopt an advanced code considering the following available options:
  - 2012 IGCC
  - Core Performance Guide
  - Advanced Energy Design guide
  - Other general models, such as IECC+15 percent
- **Enhanced Code Enforcement and Compliance.** The County could adopt mechanisms to evaluate compliance rates, further facilitate enforcement of existing building energy and green building codes, and drive up rates of compliance. Once baseline compliance rates are determined, the County would set compliance goals and targets for each code, as well as timeframes for achieving those goals and targets. The County may consider developing a formal plan to institutionalize the evaluation process, address compliance and enforcement barriers, and maximize compliance rates. Other best practices include holding trainings for designers and builders, making compliance tools available in concert with trainings, designating energy champions within building departments, and leveraging public resources such as the DOE Building Codes Program and the Building Codes Assistance Project.<sup>61</sup>

### *Implementation Strategies*

To ensure the long-term success of the codes, the County may wish to consider the following implementation strategies:

- **Phased Implementation** - The County could use a phased approach to increasing energy efficiency standards based on building size or sector.
- **Minimized Redundancy** - The County could identify areas where existing policies overlap or negate proposed new policies. For example, maintaining the Green Building Law or implementing the IGCC would include energy efficiency requirements as stringent as most IECC amendments, so both types of policies would not be needed.
- **Push-Pull Approach** - The County could consider creating a tiered program that utilizes a combination of mandatory base building codes and additional incentives (e.g., tax credit, streamlined permitting) to encourage builders and developers to strive for higher energy or environmental performance standards.
- **Utility Partnerships** - The County could partner with electric and gas utilities to help provide code education and enforcement through its touch points with customers. This strategy may require coordination with the Public Service Commission (PSC) to enable the utilities to gain credit towards their energy efficiency goals for code-related measures. Utilities could also field test emerging energy-efficient technologies and practices that could be adopted in future code cycles.

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<sup>61</sup> Metropolitan Mayors Caucus. 2010. *Best Practices in Municipal Energy Code Compliance and Enforcement*. Downloadable from the Building Codes Assistance Project at [www.bcap-energy.org](http://www.bcap-energy.org)  
Online Code Enforcement and Advocacy Network (OCEAN): [www.energycodesocean.org](http://www.energycodesocean.org)

### ***Target Audience and Key Stakeholders***

The target audience of the policy includes developers, architects, builders, and code enforcement staff. Other affected stakeholders may include:

- Interest groups that represent developers and real estate professionals could help educate affected stakeholders.
- Utility companies, if awarded credit for code enhancement/enforcement activities, could provide training and technical assistance to improve code uptake and could field test technologies and practices to be adopted in future code cycles.

### ***Performance Measurement***

Potential performance measures to track include:

- Energy savings expected by adoption of advanced energy or green building code.
- Number and percent of buildings that comply with the current code.
- Quantity and percent of new/renovated square footage that comply with the current code.
- Number of developers, architects, builders, and code enforcement personnel trained.

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use** - In 2003, building scientists estimated that if every state adopted up-to-date model energy codes and increased compliance, annual U.S. energy savings could reach 0.85 quads, equivalent to roughly 167 million barrels of crude oil.<sup>62</sup> In 2009, DOE estimated that adopting ASHRAE Standard 90.1-2007 would reduce Maryland's energy use by 4 percent to 6 percent compared to the IECC 2006 that was in place at the time of the study.<sup>63</sup>
- **Energy Cost Savings** - Codes require builders to incorporate efficiency into new construction, passing the benefits and the costs on to the future owner. A 2009 DOE study estimated energy cost savings of 4 percent to 5 percent if Maryland adopted ASHRAE Standard 90.1-2007 over the IECC 2006, then in place. A nationwide study estimated that energy use and cost intensity would improve by 18 percent if ASHRAE 90.1-2010 replaced ASHRAE 90.1-2007 nationally.<sup>64</sup>

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<sup>62</sup> Prindle, William et al., *Energy Efficiency's Next Generation: Innovation at the State Level*, Report Number E031, ACEEE, November 2003. <http://www.aceee.org/research-report/e031>.

<sup>63</sup> Pacific Northwest National Laboratory, *Impacts of Standard 90.1-2007 on Commercial Buildings in Maryland*, prepared for DOE Building Energy Codes Program, September 2009. [http://www.energycodes.gov/publications/techassist/commercial/Commercial\\_Maryland.pdf](http://www.energycodes.gov/publications/techassist/commercial/Commercial_Maryland.pdf).

<sup>64</sup> Halverson, M., B. Liu, and M. Rosenberg, *ANSI/ASHRAE/IES Standard 90.1-2010 Final Determination Quantitative Analysis*, October 2011. <http://www.energycodes.gov/status/documents/FinalQuantitativeAnalysisReport901-2010Determination.pdf>.

## ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options** - Building codes impact building energy use during the construction process when it is cheapest to implement efficiency measures. . However, reviewing and adopting a new code and increasing compliance require staff with appropriate time and expertise. Review of a new code may involve a stakeholder consultation process, which can increase costs. Increasing compliance would require more hours from well-trained code officials, as well as outreach and training for the construction community. Some jurisdictions have found third-party contractors for inspection and training to be a cost-effective way of boosting compliance.<sup>65</sup> The County may also be able to adjust permitting fees to provide more program income. Local utilities may be willing to fund some compliance studies and activities where they overlap with a utility's energy-savings goals. Utilities also may be able to provide innovative or lower-cost inspection and training services.<sup>66</sup>
- **Other Considerations** - Building codes are often more cost-effective and more easily implemented than other guidelines or voluntary programs such as weatherization and green building programs. Programs focusing on increasing code compliance can have big impacts on building sectors previously unengaged due to small size, bad information, or lack of capacity, as code requirements are typically more accessible than alternative programs.

## ***Communities with Similar Policies/Programs***

Other jurisdictions that have adopted advanced green building codes include the following:

- San Antonio, Texas, Sustainable Building Code: San Antonio has outlined pathways to reach the community's overall goal of 15 percent energy use reduction relative to the 2008 code baseline (IECC 2000 w/ 2001 supplement and ASHRAE 90.1-1999). Commercial buildings can exhibit compliance to models such as IECC 2009, ASHRAE 90.1-2007, ASHRAE Advanced Energy Design Guides, and LEED, or use energy modeling to demonstrate a 15 percent reduction. Water efficiency measures and ENERGY STAR qualified roofs are also mandated as local amendments to the adopted codes. In March 2012, the City enacted the IECC 2009 and other ICC 2012 codes. It is not yet clear how the Sustainable Building Code will be revised to reflect the new energy baseline of IECC 2009. However, the City is progressing towards 30 percent energy savings by 2012 (over 2008 codes) and net-zero new construction by 2030 via regular code review, as well as several additional incentives and programs.

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<sup>65</sup> Northeast Energy Efficiency Partnership. *Enhancing Energy Code Compliance with Third Party Energy Specialists*. March 2012.  
[http://neep.org/uploads/NEEPResources/id772/RI%20Third%20Party%20Inspection%20White%20Paper\\_March\\_2012.pdf](http://neep.org/uploads/NEEPResources/id772/RI%20Third%20Party%20Inspection%20White%20Paper_March_2012.pdf)

<sup>66</sup> For more information about utility partnerships for code enforcement, see this white paper: Midwest Energy Efficiency Alliance, *Utility Programs and Building Energy Codes*, April 2012.  
[http://mwalliance.org/sites/default/files/uploads/MEEA\\_2012\\_Utility-Programs-and-Building-Energy-Codes.pdf](http://mwalliance.org/sites/default/files/uploads/MEEA_2012_Utility-Programs-and-Building-Energy-Codes.pdf).

- San Francisco, California, Green Building Code (Chapter 13C and AB-093):<sup>67</sup> San Francisco adopted the California Green Building Standards Code, with stricter local requirements, as a mandatory code applicable to all commercial and residential new construction of any size and major renovations of more than 25,000 ft<sup>2</sup>. The required certification levels increase over time for large commercial buildings. Third-party certification, such as LEED or GreenPoint, or third-party design review is required in most cases, easing the city's inspection burden. New construction is also required to perform 15 percent better than the California Energy Code (Title 24 Part 6).

Other jurisdictions that have studied code compliance and launched compliance encouragement programs include:

- Vermont, Energy Code Compliance Plan Project: The State has developed a plan to achieve 90 percent code compliance statewide by February 1, 2017.<sup>68</sup> The plan examines compliance with current energy code via surveys and stakeholder engagement; identifies key barriers to compliance; lays out a methodology for verifying compliance; and discusses enforcement, outreach and education, and funding. The compliance project's website provides the survey used and research conducted of other states' code compliance.
- The Building Codes Assistance Project (BCAP) also offers a Compliance Planning Assistance Program<sup>69</sup> that analyzes state code programs to identify gaps between adoption of energy codes and full compliance and suggests best practices and strategies for improving compliance. These reports, for 22 different states, can provide a range of ideas for creating a countywide plan to increase compliance with current codes.
- The U.S. Department of Energy's Building Energy Codes Program<sup>70</sup> provides several policies from a variety of states and cities, sorted by topics, such as Code Adoption and Compliance, Exceeding the Code, and Green Building. These sample codes can serve as models and examples for new ordinances for Montgomery County.

### 3.5 Building Energy Retrofit Requirements

This policy would require that certain types of cost-effective energy efficiency improvements be implemented in existing buildings by a certain date or at defined points in the building lifecycle. This policy adds to the building codes approach by targeting specific, large efficiency opportunities that are frequently "lost" to market barriers.

Specific proposed requirements could include (but are not limited to) the following:

- Replace inefficient outdoor lighting with high efficiency alternatives.

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<sup>67</sup> For more information about the initial implementation of San Francisco's code, visit [http://www.seattle.gov/environment/Documents/GBTF\\_NewBldg\\_SF\\_GreenBldgOrd\\_Case\\_Study.pdf](http://www.seattle.gov/environment/Documents/GBTF_NewBldg_SF_GreenBldgOrd_Case_Study.pdf).

<sup>68</sup> Energy Futures Group et al., *Vermont Energy Code Compliance Plan: Achieving 90% Compliance by 2017*, prepared for the Vermont Department of Public Service, 2012. <http://www.leg.state.vt.us/reports/2012ExternalReports/280507.pdf>.

<sup>69</sup> For more information about BCAP's Compliance Planning Assistance program, visit <http://energycodesocean.org/compliance-planning-assistance-program>.

<sup>70</sup> For more information about DOE's Building Energy Codes Program, visit <http://www.energycodes.gov/>.

- Install energy sub-metering on individual tenant units for residential properties with more than 50 dwelling units and commercial office properties over 10,000 ft<sup>2</sup>.
- Require buildings to comply with current energy code requirements at the time of sale or ownership transfer.

It is anticipated that all mandates would be phased in over time. For example, the largest buildings or energy consumers would be included first, followed by smaller buildings or organizations. For sectors where the economic barriers are extremely high, exemptions could be provided, deadlines could be extended, or incentives could be provided to cover part of the costs.

### ***Policy/Program Approach***

For the County to achieve its aggressive energy and greenhouse gas reduction targets, commercial building owners and operators must look beyond enhanced operations and maintenance strategies and other “low-hanging fruit” to identify and implement more substantial energy reduction measures. At the national level, roughly 2 percent of commercial buildings, or 2 billion ft<sup>2</sup>, are being retrofitted each year, with median savings of 11 percent per building.<sup>71</sup> Growing emphasis is also being placed on “deep retrofits” that can deliver savings of 50 percent or more and that focus on the strategic application of comprehensive measures that might normally be overlooked due to higher first costs.<sup>72</sup> While the County’s proposed prescriptive retrofit policy does not require a “deep retrofit” approach, it includes a mandatory framework to drive the implementation of more aggressive energy reduction measures than might be expected in the absence of such policy.

While final regulations would include more specifics, the proposed approach would likely contain the following elements:

- **“Trigger” and Timeframe for Compliance** - Based on feedback from stakeholders, the County would institute a compliance timeframe based on one or more of the following options:
  - *Deadline-driven:* The County would set a date by which all owners of covered buildings must implement one or more required measures. New York City<sup>73</sup> and Boulder, Colorado,<sup>74</sup> have employed this approach. These deadlines could also be phased in over a

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<sup>71</sup> Olgyay, Victor and Cherlyn Seruto, “Whole Building Retrofits: A Gateway to Climate Stabilization,” *ASHRAE Transactions*, 2010, vol. 116, part 2. <http://www.rmi.org/Knowledge-Center%2FLibrary%2F2010-11-WholeBuildingRetrofits>.

<sup>72</sup> See, for example, the Rocky Mountain Institute’s *Retrofit Depot* at [http://www.rmi.org/retrofit\\_depot](http://www.rmi.org/retrofit_depot). Other initiatives focused on this approach include the Clinton Climate Initiative’s *Building Retrofit Program* (<http://www.clintonfoundation.org/what-we-do/clinton-climate-initiative/building-retrofit-program>), and one of the leading examples is the recent retrofit of the Empire State Building ([http://www.esbnyc.com/sustainability\\_energy\\_efficiency.asp](http://www.esbnyc.com/sustainability_energy_efficiency.asp)).

<sup>73</sup> For more information about New York City’s approach, visit <http://www.nyc.gov/html/gbee/html/plan/ll88.shtml>.

<sup>74</sup> For more information about Boulder’s approach, visit [http://www.bouldercolorado.gov/index.php?option=com\\_content&task=view&id=13982&Itemid=22](http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=13982&Itemid=22).

period of time according to building size, similar to the benchmarking and retro-commissioning policies.

- *Performance-driven*: Owners of buildings that do not meet a minimum set of criteria would be required to implement one or more required retrofit measures. Criteria could include a building’s ENERGY STAR score, EUI, or “points” on a prescriptive checklist of current energy conservation measures. Austin, Texas, has used this approach in implementing its local benchmarking and disclosure ordinance for multifamily properties whose EUI exceeds 150 percent of the average for all multifamily properties in Austin’s municipally owned utility’s service area.<sup>75</sup>
- *Transaction-driven*: Transactions could include equipment “burnout” or other natural-replacement situations, or transactions involved sale or refinance. In the latter case, owners of buildings that are being sold, refinanced, or significantly renovated would have to demonstrate that they have implemented one or more required measures. Berkeley, California, has used this model for its local commercial energy conservation ordinance.<sup>76</sup>
- **Technical and Financial Assistance** - The County would assist owners of covered buildings in identifying and obtaining necessary financial and technical assistance resources. This could include directing building owners to third-party, unbiased resources from EPA or DOE, and/or assembling a directory of qualified contractors who can assist the building owner in the selection, planning, and implementation of retrofits. The County would also assist owners of covered buildings in identifying federal/state/local incentives and utility rebates that can help offset the cost of these retrofits. The provision of technical and financial assistance would be coordinated with other relevant County policies under consideration, including energy assessments/RCx, tax credits, etc.
- **Education and Communication of Retrofit Value Proposition** - The County would develop a set of case studies on building owners that have implemented one or more of the proposed retrofit measures. These resources would provide real-world information regarding the implementation costs, energy savings, and other benefits resulting from these retrofits and would also include a discussion of any technical or financial assistance received. The County would also make sure that utilities and relevant community organizations had access to these case studies, fact sheets, and other resources to help educate affected stakeholders.
- **Reporting Requirements** - The County would establish a reporting system through which owners of covered buildings can demonstrate compliance with retrofit requirements. This would likely entail the submission of a certification form and supporting documentation and could also include the requirement for a site visit by a County official or other third party to confirm completion of the retrofit(s).
- **Penalties for Non-compliance** - The County would set a schedule of fines at a level that encourages compliance and minimizes the County’s collection burden. As appropriate, these fines could be used to fund other policy measures, such as a Community Energy Challenge.
- **Exemptions** - Compliance with the policy may be waived for covered buildings that have demonstrated one or more of the following within the previous two years:

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<sup>75</sup> For more information about Austin’s approach, visit <http://www.austinenenergy.com/about%20us/environmental%20initiatives/ordinance/multifamily.htm>.

<sup>76</sup> For more information about Berkeley’s approach, visit <http://www.ci.berkeley.ca.us/contentdisplay.aspx?id=15474>.

- ENERGY STAR certification or achievement of a minimum score in Portfolio Manager.
- LEED certification.
- Compliance with the building energy code currently in effect which could be implemented with flexibility options, such as an “equivalent performance” path showing that major improvements had been made and achieved performance equivalent to code compliance.
- Financial hardship, historic buildings, or technical infeasibility.

### ***Implementation Strategies***

To ensure the long-term success of the policy, the County may wish to consider the following implementation strategies:

- **Leading by Example** - Implementing required retrofits in public buildings first can enhance the County’s reputation as a good steward of taxpayer dollars, finite energy resources, and the environment while demonstrating the cost-effectiveness of retrofits for affected private sector building owners.
- **Portfolio Approach** - Energy retrofit policies can be linked with benchmarking and energy assessment/RCx policies, as has been done with New York City’s Greener, Greater Buildings Plan.<sup>77</sup> The County could similarly consider packaging a portfolio of energy efficiency policies targeting existing commercial buildings. In doing so, the County would help drive the connection between *information* (benchmarking and assessments) and *action* (RCx, retrofits). A leadership challenge could similarly coordinate with a retrofit policy by motivating awareness and educating County businesses about the energy, social, and financial benefits of energy performance and improvements. The County could also link retrofit requirements with available financing incentives, including those provided by the County, state and federal government, and area utilities. The availability of County-sponsored or supported financing options may help offset initial resistance to mandated building upgrades.

The following modifications could be made to the prescriptive retrofit policy as currently described to ease the stringency of the requirements and reward more voluntary action:

- Where applicable, raise the threshold for minimum building size exemption to minimize the number of buildings and stakeholders affected.
- Allow additional exemption criteria to minimize the number of buildings and stakeholders affected.
- Alter the trigger for compliance (e.g., deadline-driven vs. performance-driven vs. transaction-driven) to appeal to a larger population of stakeholders.
- If the retrofits will be implemented according to a set timeframe, the County could:
  - Delay the compliance deadline (e.g., from five years to 10 years)
  - Allow a voluntary compliance window for an initial period (e.g., five years) and provide incentives to encourage early action before mandatory requirements take effect

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<sup>77</sup> For more information about New York City’s Greener, Greater Buildings Plan, visit <http://www.nyc.gov/html/gbee/html/plan/plan.shtml>.

- Allow affected building owners to pay a compliance fee in lieu of making the required retrofit. The funds could be used to fund other community energy efficiency projects or related policies and programs.

### ***Target Audience and Key Stakeholders***

The target audience of the policy would vary by the type of retrofit required, but likely would apply to owners of buildings greater than 10,000 ft<sup>2</sup> to align with other policies under consideration. Affected stakeholders may include:

- Interest groups that represent building owners and managers, tenants, and energy service providers could help educate building owners and managers.
- Energy service providers could help building owners and managers comply with the policy and understand their energy efficiency opportunities.
- Vendors could provide and install the high-efficiency products mandated by the retrofit requirements.
- Utility companies could provide technical assistance and incentives for identified energy efficiency projects.

### ***Performance Measurement***

Potential performance measures to track include the following:

- Number and percent of covered buildings that comply with the policy.
- Quantity and percent of square footage of covered buildings that comply with the policy.
- Number and types of retrofit projects completed as a result of the policy.
- Number of jobs created or maintained as a result of the policy.

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use** - Of the roughly 2 billion ft<sup>2</sup> of commercial buildings that are retrofitted each year, studies show a median energy savings of 11 percent per building.<sup>78</sup> In the case of “deep retrofits,” these savings can exceed 50 percent per building. By combining energy retrofits with careful attention to operations and maintenance, as well as building operator and occupant training, building owners and managers can further enhance and sustain these savings. One proposed requirement, the installation of “cool” or “green” roofing at the time of roof replacement, demonstrates the significant energy savings potential that can be driven by mandatory retrofits. According to EPA calculations, ENERGY STAR qualified roof products can reduce peak cooling demand by as much as 15 percent.<sup>79</sup> Lawrence Berkeley National Laboratory suggests that these savings could translate into annual savings

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<sup>78</sup> Olgyay and Seruto, *Whole Building Retrofits: A Gateway to Climate Stabilization*, 2010.

<sup>79</sup> See [http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product.showProductGroup&pgw\\_code=RO](http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=RO).

of \$0.10 per square foot in hot climates and \$0.03 per square foot in colder climates.<sup>80</sup> At the national level, if 80 percent of all commercial building roof area were retrofitted with “cool roof” material, this would result in cost savings of \$735 million.<sup>81</sup> While the ICF analysis of County commercial buildings in the Maryland climate did not show these kinds of energy savings, the County could pursue this option on a case by case basis. For example, an air-conditioned warehouse with little or no existing insulation may be able to be reroofed so as to show significant savings with this technology.

- **Energy Cost Savings** - Cost savings from energy retrofits are expected to be in line with energy savings, and can be even greater when factoring in avoided maintenance costs.
- **Increased Property Value** - Buildings that have completed energy efficiency upgrades and improved their performance may be eligible to earn ENERGY STAR, LEED, or other certification. Buildings that have been recognized for their energy performance have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>82,83,84,85</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### *Implementation Costs and Other Considerations*

- **Implementation Costs and Funding Options** - Given the array of retrofit projects being considered as part of this policy, the cost of specific energy efficiency retrofits will vary widely, depending on the nature of the measures required by the County. The County will, however, incur some cost in providing education and training on the policy’s requirements, developing case studies on successful implementations, and establishing a reporting infrastructure. Furthermore, the County would need to account for the costs of providing various financing and funding options discussed in other sections of this report. Administrative and management costs associated with this policy can be mitigated by leveraging the same infrastructure used for other policies, such as the energy assessment/RCx policy. The County may also be able to use DOE’s open-source SEED Platform to avoid some of the costs associated with developing the basic building blocks of such a tracking & reporting system.
- **Other Considerations** - Given the significant opposition to this policy that is expected from the business community, it may be necessary to consider more voluntary approaches to drive commercial building retrofits. One suggestion offered by a stakeholder is to focus on the development of case studies on buildings that have already implemented specified retrofit

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<sup>80</sup> EPA, “Roof Products for Consumers,” ENERGY STAR.

[http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product.showProductGroup&pgw\\_code=RO](http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=RO).

<sup>81</sup> Levinson, R. and H. Akbari, “Potential benefits of cool roofs on commercial buildings: conserving energy, saving money, and reducing emission of greenhouse gases and air pollutants,” Energy Efficiency, Vol. 3, pp. 53-109.

<http://heatisland.lbl.gov/publications/potential-benefits-cool-roofs-commercial-buildings-conserving-energy-saving-money-and-r>.

<sup>82</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>83</sup> IMT, “Energy Efficiency and Property Value.”

<sup>84</sup> Pogue et al., “Do Green Buildings Make Dollars & Sense?”

<sup>85</sup> Finlay and Kok, “Valuing Sustainable Real Estate,” 2011.

measures and to use those real-world examples to demonstrate the cost-effectiveness and overall benefit of this activity. Such an initiative could be coordinated with the Community Energy Challenge.

### ***Communities with Similar Policies/Programs***

Other jurisdictions that have adopted mandatory retrofit policies include the following:

- Austin, Texas, Energy Conservation Audit and Disclosure Ordinance: As part of its local benchmarking and disclosure ordinance, Austin requires multifamily buildings for which energy consumption is 150 percent higher than the average for similar local properties are required to take steps to reduce their energy consumption by 20 percent or more within 18 months. Austin's municipally owned utility is investigating a package of efficiency measures that property owners could undertake to reach the 20 percent savings goal.
- Berkeley, California, Commercial Energy Conservation Ordinance: Berkeley requires commercial building owners to undertake specified energy efficiency measures if the building is sold or major renovations are performed. By default, the seller is responsible for ensuring that the property is in compliance prior to sale, although the buyer may choose to assume responsibility for implementing required measures within 15 months of purchase.
- Boulder, Colorado, SmartRegs: Boulder requires owners and managers of all rental housing in the city to undertake a set of energy efficiency retrofits by January 2019. Compliance pathways include a performance-based approach (based on HERS score) and a prescriptive, checklist-based approach. The City of Boulder provides a dedicated *EnergySmart* service to assist owners and managers of rental properties to identify and install necessary upgrades. The City also provides assistance in locating a number of incentives that can help to offset the cost of compliance. Boulder is considering expanding the retrofit requirements to the commercial sector to help the City achieve its greenhouse gas reduction goals.
- New York City, New York, Local Law No. 88 (part of the Greener, Greater Buildings Plan): Requires covered buildings to upgrade lighting to meet the latest New York City Energy Conservation Code by January 1, 2025. Covered buildings must also install sub-meters for nonresidential tenant spaces by the same deadline.

## **Enabling Investment in Energy Efficiency**

### **3.6 Energy Efficiency/Green Building Tax Credit**

In 2006, the County instituted the Energy and Environmental Design, or "Green Building," property tax credit for commercial buildings that meet defined green building standards. While this credit is often seen as applying to new construction only, it also applies to existing buildings under certain conditions. Generally speaking, tax credits tend to be used more in project development and construction as part of the initial financing structure; it is possible that they could gain more interest at times of sale, refinancing, or major renovation. Going forward, the County may consider adjustments to the credit as well as new funding levels.

The property tax system is one of the most concrete ways the County can offer clean energy incentives to property owners, and the green building credit was designed with that intent. The credit is administered by the County's Department of Finance. Property owners submit an

application and credits are granted in the order that complete applications are received. The credit starts at 10 percent of property taxes for the minimum LEED Silver certification level and rises as high as 75 percent for certain building types that attain LEED Platinum certification, the system's highest level.

The existing tax credit has been utilized 19 times over the past two years, with 8 recipients in 2009 (\$1,295,677 credited) and 11 recipients in 2010 (\$1,507,567 credited).<sup>86</sup> The annual funding cap of \$5 million has not been reached in a fiscal year since the implementation of the credit. The County should consider new ways to use this approach to encourage both new and existing buildings to become more energy-efficient among other green building practices.

### ***Policy/Program Approach***

The tax credit may be granted against the General County real property tax and special service area taxes for buildings that achieve a minimum Silver LEED certification for new construction (LEED-NC), core and shell (LEED-CS), or existing buildings (LEED-EB). The Director of the Department of Permitting Services can grant the credit for other high-performing buildings that he/she determines is equivalent to a Silver, Gold, or Platinum LEED rating. The tax credit must be applied for within one year of the building being certified and is granted against the County taxes as follows:

For a *covered building*, defined as a newly constructed or extensively modified nonresidential or multifamily residential building that has or will have at least 10,000 ft<sup>2</sup> of gross floor area:

- 25 percent of the property tax owed on the building for 5 years if the building achieves a Gold rating for LEED-NC or LEED-CS or an equivalent standard
- 75 percent of the property tax owed on the building for 5 years if the building achieves a Platinum rating for LEED-NC or LEED-CS or an equivalent standard
- 10 percent of the property tax owed on the building for 3 years if the building achieves the Gold rating for LEED-EB or an equivalent standard
- 50 percent of the property tax owed on the building for 3 years if the building achieves the Platinum rating for LEED-EB or an equivalent standard

For any other building, the amount of the credit is:

- 25 percent of the property tax owed on the building for 5 years if the building achieves a Silver rating for LEED-NC or LEED-CS or an equivalent standard
- 50 percent of the property tax owed on the building for 5 years if the building achieves a Gold rating for LEED-NC or LEED-CS or an equivalent standard
- 75 percent of the property tax owed on the building for 5 years if the building achieves a Platinum rating for LEED-NC or LEED-CS or an equivalent standard
- 10 percent of the property tax owed on the building for 3 years if the building achieves the Silver rating for LEED-EB or an equivalent standard

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<sup>86</sup> Montgomery County, Maryland, Tax Expenditure Report: Property Tax Credits, Tax Deferral, and Tax Exemptions, Department of Finance, June 2011.

[http://www.montgomerycountymd.gov/content/finance/data/taxes/Tax\\_Expenditure\\_Report\\_FY11.pdf](http://www.montgomerycountymd.gov/content/finance/data/taxes/Tax_Expenditure_Report_FY11.pdf).

- 25 percent of the property tax owed on the building for 3 years if the building achieves the Gold rating for LEED-EB or an equivalent standard
- 50 percent of the property tax owed on the building for 3 years if the building achieves the Platinum rating for LEED-EB or an equivalent standard

### ***Implementation Strategies***

The County could consider the following modifications to the existing tax credit as it is currently codified:

- **Additional Energy Performance Requirements-** LEED-NC currently does not require a specific level of energy performance for new construction, though LEED-EB v2009 requires a minimum ENERGY STAR score of 69, and LEED-EB v2012, to be released in fall 2012, may raise the score requirement to 75 to align with ENERGY STAR certification. To meet County policy goals, specific energy performance levels (e.g., minimum ENERGY STAR score of 75) could be added on to LEED criteria. For LEED-NC, architects and developers could be required to use Target Finder, which is a comparable tool to Portfolio Manager that helps establish energy performance targets for new buildings.
- **Increased Funding Limit-** The credit is currently capped at \$5 million per fiscal year. Raising the limit could allow more owners to participate in the future. However, the full funding amount of the credit has not been reached, so this option might only be necessary if application rates increase.
- **Modified Credit Percentages or Eligibility Levels-** The County could raise or lower the percentage of tax amounts due. Or, the County could make it more or less difficult to qualify based on setting prescriptive technical criteria thresholds rather than tying the credit to LEED certification, which allows design teams to select among a number of green building options. While the current credit percentages and eligibility levels are in line with similar policies, the majority of building owners and managers surveyed by the County supported the idea of increasing credit levels and modifying the eligibility requirements for the tax credit.
- **Alternate Credit Determination** The County could base the credit on a percentage of actual and allowable costs incurred for projects implemented to achieve certification instead of on the property tax value. This approach, which is used by the City of Rockville, would apply a single dollar amount over the credit period that corresponds to the level of investment in the building.
- **Improved Outreach and Education-** At least a third of the commercial building owners and managers surveyed as part of this study did not know that the tax credit existed. Among other building stakeholders, 62 percent were not aware of the credit. An outreach strategy could contribute to increased participation rates and potentially motivate additional green building projects. The tax credit could also be made part of a community challenge initiative, possibly linked to the Green Business Certification program, in which participants would get points and recognition for buildings that met tax credit criteria as well as improvements in existing buildings.

### ***Target Audience and Key Stakeholders***

The target audience of the policy includes taxpayers in Montgomery County who own high performance buildings that achieve LEED-NC, LEED-CS, or LEED-EB Silver, Gold, or Platinum ratings or an equivalent rating (as determined by the Director of the Department of Permitting Services). Other stakeholders may include:

- Interest groups that represent property owners or real estate professionals could help communicate information about this credit to potential applicants.
- Utility companies, energy service providers, and green building professionals could provide technical assistance and incentives for identified energy efficiency projects contributing to the achievement of LEED certification or equivalent.

### ***Performance Management***

Potential performance measures to track include:

- Number, percent, and type of buildings that apply for the tax credit
- Number, percent, and type of buildings that receive the tax credit
- Number, percent, and type of buildings that apply but do not receive the tax credit
- Number of tax credits and amount of credit granted for each LEED certification system and level or other adopted performance metric (e.g., ENERGY STAR score)
- Average amount of tax credit applied for, granted, and denied by building type

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** In a post-occupancy study of the U.S. General Services Administration's (GSA) portfolio of buildings, researchers found that LEED Gold certified buildings generally consumed 25 percent less energy compared to the average commercial building.<sup>87</sup> The U.S. Green Building Council (USGBC) that administers the LEED system claims similar energy savings of 26 percent.<sup>88</sup> Requiring adherence to specific energy performance standards instead of or in addition to LEED could increase energy and cost savings.
- **Energy Cost Savings-** LEED certified buildings are designed to operate more efficiently than average buildings, thereby affording property owners and tenants lower energy bills and reduced operational costs. According to the USGBC, green buildings have 13 percent lower maintenance costs in comparison to the average commercial building.<sup>89</sup>

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<sup>87</sup> Fowler, Kim et al., *Re-Assessing Green Building Performance: A Post Occupancy Evaluation of 22 GSA Buildings*, Pacific Northwest National Laboratory (PNNL), September 2011.

[http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-19369.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19369.pdf).

<sup>88</sup> USGBC, *Roadmap to Green Government Buildings*, 2011.

<http://www.usgbc.org/ShowFile.aspx?DocumentID=5486>.

<sup>89</sup> Ibid.

- **Increased Property Value-** In addition, high performing buildings, such as LEED certified buildings or those that have earned the ENERGY STAR, have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>90,91,92,93,94</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options-** The County may incur some minimal cost in developing revisions to the existing policy and performing outreach to stakeholders to increase awareness of the availability of the credit.
- **Other Considerations-** As with any tax credit, implementation will result in decreased revenue to the County. However, it is difficult to calculate exact fiscal impacts of the tax credit, due to challenges forecasting the number of participating properties and the level of LEED certification that will be achieved in any given year. The annual cap on the cumulative amount of all tax credits granted to all applicants for a given year serves as a ceiling for the policy.

### ***Communities with Similar Policies/Programs***

The Maryland legislature enacted a green building tax credit in 2000, whose funding has expired. Other jurisdictions that have adopted green building tax credits include the following:

- Carroll County, Maryland, Green Building Tax Credit (Ordinance 09-03): Carroll County provides a 25 percent tax credit for new nonresidential buildings that achieve LEED Silver certification or equivalent, a 50 percent tax credit for new buildings that achieve LEED Gold certification or equivalent, and a 75 percent tax credit for new buildings that achieve LEED Platinum certification or equivalent for a period of 5 consecutive years.
- Hagerstown, Maryland, High Performance Buildings Tax Credit (Ordinance 2009-2): Hagerstown provides a 20 percent property tax credit for LEED Silver certification, a 25 percent property tax credit for LEED Gold certification, and a 30 percent property tax credit LEED Platinum certification.
- State of New Mexico, Sustainable Building Tax Credit (SB 291): New Mexico provides tax credits based on square footage for new construction/renovations and existing buildings. The per-ft<sup>2</sup> credit decreases in value with building size so that the first 10,000 ft<sup>2</sup> are credited at a higher amount, the next 40,000 ft<sup>2</sup> receive a lower credit amount, and anything around 50,000 ft<sup>2</sup> is credited at an even lower amount. For example, for LEED-NC Silver certification, a building owner would receive a \$3.50 credit for the first 10,000 ft<sup>2</sup>, \$1.75 for 10,001 through 50,000 ft<sup>2</sup>, and \$0.70 for 50,001 ft<sup>2</sup> to 500,000 ft.<sup>2</sup>

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<sup>90</sup> Ibid.

<sup>91</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>92</sup> IMT, "Energy Efficiency and Property Value."

<sup>93</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>94</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

### 3.7 Property-Assessed Clean Energy Financing

The Property Assessed Clean Energy (PACE) financing mechanism would allow commercial property owners to undertake energy efficiency and renewable energy projects through long-term, secured loans repaid through County property tax bills. Repayment terms would range from five to 20 years, matching the useful life of many energy-efficient technologies. State authority for the County to set up a PACE program, under some circumstances, already exists under Maryland House Bill 1567,<sup>95</sup> enacted in 2009. The County would create a special tax assessment district and would attach repayment to property tax obligations. Capital could come from public or private sources, although the use of private third-party funds may require additional legal authority to enable the use of the County tax system to repay private loans. The County would also establish other necessary application, approval, oversight, and quality control methods. Property owners and their contractors would develop eligible projects, gain County approval, complete loan arrangements, and repay loans via property tax bills. Should an owner sell the property prior to the end of the loan term, the loan repayment obligation is transferred to subsequent owners until paid off.

Because PACE programs rely on high volumes to attract third-party investors, PACE programs can work well as regional initiatives. The District of Columbia authorized PACE financing in April 2010 and is currently piloting a program with large property portfolio owners. To support the scalability of both programs, the County would mirror the District's warehoused model in which the County, in partnership with the District, secures a commitment from one or more large capital providers to offer energy efficiency loans using common underwriting terms that can be used on an as-needed basis, within a defined time period, to fund projects. Common terms and project eligibility requirements would allow loans to be more easily aggregated and sold on the secondary market. The sale proceeds would replenish the funding pool.

Commercial PACE loans are not regulated by the Federal Housing Finance Agency (FHFA) and are not subject to the same conditions as residential PACE loans that have been stymied by concern over the senior position of PACE loans. It is unclear how many multifamily condominium properties that might be interested in participating in PACE are financed by mortgages held by FHFA-regulated and would be subject to the same constraints as single family assessments. The Federal Treasury's Office of the Comptroller of the Currency regulates commercial loan paper and has voiced concerns on commercial PACE, but has not taken action to deter its use.

#### ***Policy/Program Approach***

Commercial PACE financing can be an effective, scalable way to reduce the significant barriers to making clean energy investments in commercial properties. By creating a property tax assessment mechanism for loan payments and security, PACE enables lower interest rates and longer repayment terms, which can create positive cash flow to building owners. Furthermore,

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<sup>95</sup> For more information about HB 1567, visit <http://mlis.state.md.us/2009rs/billfile/hb1567.htm>.

PACE is a debt of property, rather than of a person or corporation, which means that PACE loans do not rely on or affect personal credit scores (though the property's creditworthiness in terms of timeliness of utility bill, tax, and other payments is considered), allowing more entities to qualify. This also means that repayment remains with the property upon transfers of ownership, allowing for investment in projects with longer paybacks that may exceed typical ownership or tenancy terms. In addition, property assessments such as PACE loans typically qualify as eligible pass-through expenses under lease terms in which property owners and tenants share utility and maintenance costs, taxes, and other shared expenses. This allows both property owners and tenants to contribute to repayment and benefit from reduced energy and maintenance costs and any energy or environmental recognition (e.g., ENERGY STAR® or LEED® certification) as a result of the energy efficiency improvements. Finally, lenders are willing to offer lower interest rates and extend larger loan amounts because PACE loans are usually senior liens, meaning any payments in default (though not necessarily the full loan amount) are repaid before other debts. These features make financing more attractive to building owners and lenders and thus may encourage building owners to pursue larger, longer-term energy efficiency upgrades. However, interested property owners may face difficulty in securing consent from the primary mortgage holder whose mortgage is made secondary to the PACE assessment.

There are three types of commercial PACE models:

- **Warehoused.** In this model, the County would secure a large line of credit from one or more capital providers that can be used on an as-needed basis, within a defined time period, to fund projects. The loans from financed projects can be aggregated and sold on the secondary market. The sale proceeds replenish the line of credit. Instead of private capital, the County could use general or reserve funds to seed a loan pool. Many of the existing PACE programs, as well as DC's under-development program, is based on this model.
- **Pooled Bond.** In this model, the County would aggregate applications for PACE financing from building owners and issue a revenue bond(s) to fund the projects. This is a relatively simple model to administer; however, implementation of the identified projects can be delayed while the County collects a sufficient number of applications. This project delay could prove unattractive to some building owners who need a fixed project implementation timeline and certainty about the interest rate, which may change while other projects are being accumulated. Boulder County pioneered the pooled bond model.<sup>96</sup>
- **Owner-arranged or Open Market.** In this model, building owners arrange their own financing without involvement from the County and use the enforceability of the property lien as security. This model is administratively less complex and therefore less costly to the County to implement, and it provides building owners greater flexibility to negotiate their own rates, terms, conditions, and schedules. However, because of the large transaction costs associated with arranging a loan, this model is likely only accessible by building owners with significant holdings who may be able to secure the financing without the property lien backing or property tax repayment structure. Such a model may also limit program scalability

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<sup>96</sup> Boulder County's PACE program has been suspended due to concerns about regulatory treatment of PACE loans. However, you can still view the program design at <http://www.climatesmartloanprogram.org/#>.

because it can be difficult to package loans with different terms and conditions for resale on the secondary market. San Francisco<sup>97</sup> and Los Angeles<sup>98</sup> use the owner-arranged model.

While final program procedures would include more specifics, the proposed approach includes:

- **Special Tax Assessment District-** The County would create and approve a legal mechanism structured as a special tax assessment district.
- **Lender Network-** The County could access DC's existing network of participating lenders, who have already agreed to common underwriting terms and conditions for eligible loans made through the District's pilot commercial PACE program. Alternatively, the County could develop a new or expanded list of qualified lenders through a request for proposal, receipt of letters of commitment, or other solicitation process.
- **Program Design-** The County would work with stakeholders to develop program rules and procedures. The County could benefit from the leg work that the District has already completed to design and pilot its program. However, the County may wish to consider the following jurisdiction-specific issues:
  - Define eligible projects/technologies to ensure that the program minimizes default risk and funds proven energy-saving technologies. The County may want to design project eligibility terms so that a minimum level of energy efficiency improvement is achieved before renewable energy technologies can qualify to promote cost-effective investment in clean energy projects that will achieve the County's energy and greenhouse gas reduction goals. For example, borrowers could have to demonstrate a minimum ENERGY STAR energy performance score (e.g., 75) or minimum percent improvement in a building's Energy Use Index (EUI—Btu per square foot) before qualifying for renewable energy financing.
  - Establish a per-project loan cap to ensure equitable distribution of PACE funds and/or a maximum loan-to-property value ratio to minimize the risk of default and other credit risk.
  - Set a maximum lien-to-property value ratio to ensure that any delinquent PACE assessment that is senior to the mortgage is nominal in value compared to the outstanding mortgage. This can help gain greater support from existing mortgage holders.
  - Develop application requirements, including technical and economic review of proposed projects, and an application system.
  - Create post-funding measurement, verification, and reporting requirements. To ensure the validity of claimed savings, the County may wish to require the completion of energy assessments performed by certified contractors as a pre-condition of funding. A pre-qualified list of contractors who have completed County-approved training or received appropriate certification could be provided to lenders to help in their outreach to potential applicants.

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<sup>97</sup> For more information about San Francisco's commercial PACE program, visit [https://commercial-pace.energyupgradeca.org/county/san\\_francisco/overview](https://commercial-pace.energyupgradeca.org/county/san_francisco/overview).

<sup>98</sup> For more information about Los Angeles' commercial PACE program, visit [https://commercial-pace.energyupgradeca.org/county/los\\_angeles/overview](https://commercial-pace.energyupgradeca.org/county/los_angeles/overview).

- **Education and Outreach-** The County would launch and market the program in collaboration with stakeholders. Again, the County could benefit from the education that the District has already provided to the jurisdictions' shared lender and real estate community. The County may also wish to consider the following strategies:
  - Start by targeting the largest property holders with portfolios of buildings to help scale the program while balancing risk as the program gains traction.
  - Create a helpdesk function for questions and technical assistance. Sonoma County's relatively long-running PACE program has six full-time equivalents who field more than 30 phone calls, five e-mails, and five walk-ins from potential borrowers each day.<sup>99</sup>
  - Share information about the available PACE financing with other County and utility energy efficiency program administrators.

### *Implementation Strategies*

To ensure the long-term success of the policy, the County may wish to consider the following additional or alternative credit enhancement strategies:

- **Energy Performance Guarantees-** The County could require energy performance guarantees that dictate that the expected cost savings exceed the repayment amount through the use of energy savings performance contracts or similar mechanism. This protects building owners and existing mortgage holders by ensuring a long-term positive cash flow from the funded project(s) and can help the County ensure its energy-savings goals are met.
- **Subordinate-lien PACE Financing-** A subordinate-lien PACE program makes the PACE assessment secondary to mortgage obligations. This option reduces the perception of risk to primary mortgage holders, but also typically increases the interest rate on the subordinate lien by 2 percent to 4 percent.<sup>100</sup> It also increases perceived risk by market actors, potentially increasing the difficulty of building a secondary market for PACE loans.
- **Loan Guarantees-** Loan guarantees obligate the County to guarantee all or part of the loan principal for approved loans, thus reducing lender risk and interest rates. The downside to the County is the risk of downstream financial liability, which may require more extensive project review and approval processes. Also, EECBG funds cannot be used for loan guarantees, so the County would have to fund guarantees from other sources. With EECBG funds fully obligated, this point is now moot.
- **Loan Loss Reserves-** Somewhat different than a loan guarantee, reserves create a pool of funds that reduce lender risk for a portfolio of loans. While loan guarantees are issued on individual projects, a loan loss reserve fund is used to cover any lender losses from loan defaults, up to a maximum defined by program rules. Reserves can be more flexible, are an approved use of EECBG funds, and limit County financial exposure more effectively.

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<sup>99</sup> Nock, Levin and Clint Wheelock, *PACE Financing for Commercial Buildings*, Pike Research, 2010.

<http://www.pikeresearch.com/research/pace-financing-for-commercial-buildings>.

<sup>100</sup> Supple, Derek and Olivia Nix, "Unlocking the Building Retrofit Market: Commercial PACE Financing: A Guide for Policymakers," Johnson Controls, December 2010.

<http://www.institutebe.com/InstituteBE/media/Library/Resources/Financing%20Clean%20Energy/Issue-Brief---Unlocking-the-Building-Retrofit-Market---PACE-Financing.pdf>.

### ***Target Audience and Key Stakeholders***

All types of commercial properties can benefit from PACE financing. Other affected stakeholders may include:

- Interest groups that represent property owners and managers, real estate professionals, capital providers, tenants, and energy service providers could help educate building owners and lenders.
- Utility companies could provide technical assistance and other forms of financial assistance for energy efficiency projects.

### ***Performance Measurement***

Potential performance measures to track include the following:

- Number and type of projects financed
- Projected versus actual energy savings from financed projects
- Average interest rate secured through the County's PACE financing versus the average market rate

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** Because of PACE's unique financing features, building owners may be encouraged and enabled to pursue larger, longer-term energy efficiency upgrades. This improved energy performance translates to reduced energy consumption. The actual energy savings will vary by project.
- **Energy Cost Savings-** In addition the avoided energy costs from the financed projects, PACE financing enables lower interest rates and longer repayment terms, which can create positive cash flow to building owners. In addition, property assessments such as PACE loans typically qualify as eligible pass-through expenses under lease terms in which property owners and tenants share utility and maintenance costs, taxes, and other shared expenses. This allows both property owners and tenants to contribute to repayment and benefit from reduced energy and maintenance costs and any energy or environmental recognition (e.g., ENERGY STAR or LEED certification) as a result of the energy efficiency improvements.
- **Increased Property Value-** High energy-performing buildings have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>101,102,103,104</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

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<sup>101</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>102</sup> IMT, "Energy Efficiency and Property Value."

<sup>103</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>104</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

- **Job Creation-** A snapshot assessment of Sonoma County’s economic state in 2009 suggests that its PACE program may have contributed to an 8.4 percent increase in construction-related jobs in 2009 versus a -3 percent to 1.3 percent change in neighboring counties without PACE programs.<sup>105</sup>

### *Implementation Costs and Other Considerations*

- **Implementation Costs and Funding Options-** PACE programs need to be seeded with initial public (e.g., general funds, grant funding) or private (e.g., the line of credit used in warehoused models) capital. This available pool of funding is reused for subsequent project cycles and can be repaid if the program ends. Program administration costs typically run 1 percent to 2 percent of the total outstanding loan value plus another 5 percent for credit enhancements if those are pursued.<sup>106</sup> The County can subsidize these administration costs, charge a loan origination fee to recoup some or all of the costs, or fold them into the loan repayments. Because origination costs can be significant, it often may not be economical to issue bonds in amounts less than \$10 million.<sup>107</sup>
- **Other Considerations-** Other policies under consideration by the County are likely to create demand for capital to undertake identified energy efficiency projects. In a 2010 survey of corporate decision-makers, 47 percent of respondents identified limited internal capital or insufficient return on investment as the top barrier to implementing energy efficiency projects.<sup>108</sup> PACE financing can help overcome these barriers. However, there may be some resistance by real estate finance parties who might see PACE as increasing risk or complicating their business. Even if building owners and lenders are interested in PACE, there could be significant transaction costs to add a PACE loan to the often-complex financing structure of an existing commercial building. There is also concern in commercial finance markets that falling property values may jeopardize full recovery of principal in cases of default on existing property loans. In such cases, current lenders may be wary of adding senior liens that have first claim on payments in cases of foreclosure.

### *Communities with Similar Policies/Programs*

Other jurisdictions with commercial PACE financing programs include the following:

- Boulder County, Colorado, [ClimateSmart Loan Program](#): Boulder County issued the first pooled bond program in 2009, though it was initially for residential applications only. The program was expanded to include commercial projects in 2010, but has since been put on hold due to lack of clarity about FHFA treatment of PACE loans. To secure low-interest financing, the County issued moral obligation bonds, a type of revenue bond that was strengthened by the County’s (non-legally binding) commitment to repay any payments in default. Boulder County further bought down the interest rates to participants using qualified

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<sup>105</sup> Nock and Wheelock, *PACE Financing for Commercial Buildings*, 2010.

<sup>106</sup> Nock and Wheelock, *PACE Financing for Commercial Buildings*, 2010.

<sup>107</sup> Harcourt Brown & Carey, Inc., *Energy Efficiency Financing in California: Needs and Gaps*, July 8, 2011. [http://www.performancealliance.org/Portals/4/Documents/EEFinanceReport\\_final.pdf](http://www.performancealliance.org/Portals/4/Documents/EEFinanceReport_final.pdf).

<sup>108</sup> Johnson Controls and International Facilities Management Association, “Global Energy Efficiency Indicator 2010,” 2010.

energy conservation bonds. Financed projects ranged in size from \$2,000 to \$200,000 for mostly energy efficiency projects across a range of commercial building types.

- Los Angeles County, California, PACE Program: As part of the statewide Energy Upgrade California initiative, Los Angeles County has structured one of the first owner-arranged PACE financing models. In this model, interested building owners negotiate their own financing with private lenders using the County's tax lien as security. Eligible projects must be identified through an investment-grade energy audit (ASHRAE Level 2). For projects located within city boundaries, the applicable city council must adopt a resolution opting into the County program.
- Palm Desert, California, Energy Independence Program: Palm Desert launched the first PACE program in 2008 with \$2.5 million from the City's general fund. The pool is replenished through the sale of bonds in \$2.5 million increments, and the City plans to issue aggregated bonds if demand warrants it in the future. The warehouse-based program has funded one renewable energy and two energy efficiency commercial projects ranging in size from \$23,000 to \$522,000.
- Placer County, California, mPOWER Placer program: This warehouse-based program launched in 2010 and has funded two renewable energy projects, both of which were less than \$200,000. Placer County requires a 1:10 lien-to-property value ratio.
- San Francisco (City and County), California, GreenFinanceSF program: The San Francisco program is similar to Los Angeles County's owner-arranged program with the addition of a subsidized Debt Service Reserve Fund that helps cover payments in the event of delinquent payments. The San Francisco program also allows for the financing of water conservation projects and requires renewable energy projects to also include energy efficiency measures that result in a minimum 10 percent improvement in building energy performance. The program also requires borrowers to use ENERGY STAR Portfolio Manager to track energy performance improvements and participate in available rebate programs for applicable project types.
- Sonoma County, California, Energy Independence Program: The program was launched in 2010 with \$100 million in County treasury and water agency reserve funds and uses a warehouse model. The program was design to aggregate and sell loans on the secondary market in increments of \$20 million. Sonoma County has funded energy efficiency, renewable energy, and water efficiency projects ranging in size from \$9,600 to \$2.3 million.

In addition, commercial PACE programs are under development in a number of jurisdictions across the country, including Washington, DC's program that is currently in pilot phase.

### 3.8 On-Bill Repayment/Financing

On-bill financing (OBF) enables utility customers to repay loans for energy efficiency and renewable energy investments through their utility bills. OBF comes in two main forms: on-bill financing where the serving utility provides the capital source, and on-bill repayment, where the utility billing system is used to service loans originated by third parties. There are significant differences between these forms, but for the purposes of this discussion we treat them as a single category. Most OBF programs provide relatively short-term financing, less than 10 years; however, the concept is not necessarily restricted to this loan tenure. While utilities would provide the infrastructure to integrate loan repayments with their customer billing systems,

capital could come from third-party lenders or through the use of utility ratepayer funds. The County would play a supporting role in helping establish OBF with the utilities serving the County. The County would also help customers make use of this option through education efforts and may also help arrange for local lenders and energy efficiency service providers interested in bundling energy efficiency projects with financing to participate in the effort.

OBF would likely require state legislation and/or PSC action to become available in the County. A recent PSC ruling (Order No. 84569, issued in December 2011)<sup>109</sup> found that the availability of financing has been a significant barrier to participation in utility energy efficiency programs and that convenient, low-interest financing could help overcome this barrier. House Bill 1088<sup>110</sup> was introduced during the 2012 legislative session to establish an OBF program for energy efficiency investments by residential and commercial customers, but did not advance.

### ***Policy/Program Approach***

By making financing more convenient, OBF can help overcome the barrier of lack of access to capital that inhibits many otherwise attractive efficiency investments. Specifically, OBF may help fill a gap where banks are hesitant to extend loans less than \$150,000 (which exceeds the cost of many common energy efficiency projects) because of the high transaction costs associated with underwriting and servicing each individual loan.<sup>111</sup> Furthermore, by linking the repayment with the energy costs savings visible on the utility bill, building owners and tenants are more likely to consider the long-term benefits of energy efficiency investments. A key issue in on-bill financing is whether the repayment liability remains with the meter/property upon transfers of account or building ownership. Providing for financing to pass to future account holders or building owners would allow for investments in projects with longer paybacks that may exceed typical ownership or tenancy terms. But it would also raise complications, risks, and potential legal issues.

OBF can also help provide increased access to financing for commercial customers of all sizes, as long as they have a good utility bill payment history. In California, OBF programs have been particularly attractive to small businesses.<sup>112</sup> OBF loans are often unsecured, but the threat of shutting off service can help deter potential defaults and can allow lenders to offer lower rates (in comparison to rates of 12 percent to 18 percent to finance similar energy efficiency projects<sup>113</sup>)

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<sup>109</sup> Maryland Public Service Commission, Order No. 84569, December 22, 2011.

[http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CFUQFjAC&url=http%3A%2F%2Fwebapp.psc.state.md.us%2FIntranet%2FCasenum%2FNewIndex3\\_VOpenFile.cfm%3FServerFilePath%3DC%3A%255CCasenum%255C9100-9199%255C9153%255C268.pdf&ei=dLC2T5CfA-rM2gX4\\_J3FCQ&usg=AFQjCNGybghHag\\_32cmb9Q3jIBMn80BCDg](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CFUQFjAC&url=http%3A%2F%2Fwebapp.psc.state.md.us%2FIntranet%2FCasenum%2FNewIndex3_VOpenFile.cfm%3FServerFilePath%3DC%3A%255CCasenum%255C9100-9199%255C9153%255C268.pdf&ei=dLC2T5CfA-rM2gX4_J3FCQ&usg=AFQjCNGybghHag_32cmb9Q3jIBMn80BCDg).

<sup>110</sup> For more information about HB 1088, visit <http://mlis.state.md.us/2012rs/billfile/hb1088.htm>.

<sup>111</sup> Harcourt Brown & Carey, *Energy Efficiency Financing in California*, 2011.

<sup>112</sup> Ibid.

<sup>113</sup> California Public Utilities Commission (CPUC), *Administrative Law Judge's Ruling Regarding Energy Efficiency Financing*, Rulemaking 09-11-014, filed November 20, 2009. <http://docs.cpuc.ca.gov/eFile/RULINGS/157047.pdf>.

and better terms. In fact, utility bill payment can be more reliable than debt payments.<sup>114,115</sup> Finally, OBF can help overcome the building owner-tenant split-incentive problem. By linking repayment with the utility bill, owners can pass through the energy efficiency project expense as they would with utility and other operations and maintenance expenses.

While program design details would be determined by the PSC and participating utilities, the Environmental Defense Fund recommends the following key program design features:<sup>116</sup>

- **Flexibility-** The program would allow building owner and tenants to receive financing for single-measure and whole-building projects through loans, leases, energy performance contracts, power purchase agreements (in the case of renewable energy projects), and other financing mechanisms.
- **Cost-Effective Technologies-** Eligible projects would include proven energy-saving technologies that can be cost-effectively installed. Energy savings estimation methodologies would be conservative to help customers ensure that their repayment obligations do not exceed their energy cost savings in any one repayment period, with a reasonable margin of error.
- **Measurement and Verification-** A sample of projects would be inspected by a third-party to provide quality assurance and verify claimed energy savings.
- **Bill Repayment Structure-** Loans would be paid through a line-item expense on monthly utility bills.
- **Portability-** The obligations would be attached to the meter to allow portability of the outstanding balance upon transfers of ownership or tenancy. If the balance is not paid in full at the time of transaction, the new owner/tenant would continue to pay the remaining debt but would benefit from the continued energy cost savings.
- **Consumer Protection-** To protect against unrealized energy savings, only projects with projected monthly savings that exceed loan payments with an adequate margin of error would be eligible. Likewise, the loan term would be less than the expected useful life of the energy efficiency technology. Contractors and lenders will be pre-approved by the program administrator, and contractors who have a history of projects that do not generate expected savings or otherwise complete low-quality projects as determined through post-installation inspections would be deemed ineligible. The program would offer mechanisms (e.g., a reserve fund, mandatory contractor correction) for compensating program participants whose projects underperform.

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<sup>114</sup> Byrd, Daniel J. and Richard S. Cohen, "A Roadmap to Energy Efficiency Loan Financing," Memorandum to U.S. Department of Energy, Progressive Energy Group, LLC, April 29, 2011.

<http://www.cleanenergyfinancecenter.org/wp-content/uploads/DOE-Energy-Efficiency-Report-rev-8-29-11.pdf>.

<sup>115</sup> Sweatman, Peter and Katrina Managan, *Financing Energy Efficiency Building Retrofits: International Policy and Business Model Review and Regulatory Alternatives for Spain*, Climate Strategy and Partners, 2010.

<sup>116</sup> Copithorne, Brad and James Fine, *Unlocking the Energy Efficiency Puzzle in California*, Environmental Defense Fund, 2011. <http://www.edf.org/sites/default/files/On-Bill%20Repayment-Unlocking-the-Energy-Efficiency-Puzzle-in-California.pdf>.

### ***Implementation Strategies***

To ensure the long-term success of the policy, the County may wish to provide the following support roles:

- **Program Advocate-** The County could be a convener of stakeholders, including the utilities, PSC, and General Assembly, and provide support for the creation of an OBF program.
- **Education and Outreach-** The County could help drive participation in the utilities' existing programs using OBF. The County could do so through marketing and outreach to relevant constituencies, helping them to navigate utility program offerings.
- **Stakeholder Coordination-** The County could help identify and potentially train lenders and contractors to participate in the OBF program.
- **Credit Enhancement-** The County could create a loan-loss reserve fund to help compensate customers whose projects do not generate the expected energy cost savings and who would otherwise default on their loan payments.

### ***Target Audiences and Key Stakeholders***

All types of commercial properties can benefit from PACE financing. Other affected stakeholders may include:

- Utility companies could provide the repayment infrastructure through their billing systems and can integrate OBF with existing energy efficiency programs.
- Interest groups that represent property owners and managers, real estate professionals, capital providers, tenants, and energy service providers could help educate building owners and lenders.

### ***Performance Measurement***

The utilities serving the County would be responsible for internal project evaluation. The County may also wish to track:

- Number and type of projects financed
- Projected versus actual energy savings from financed projects
- Average interest rate secured through OBF versus the average market rate

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** With OBF, building owners may be encouraged and enabled to pursue larger, longer-term energy efficiency upgrades. This improved energy performance translates to reduced energy consumption. The actual energy savings will vary by project, but one study

found that small businesses who participated in OBF programs have seen savings of 15 percent to 30 percent.<sup>117</sup>

- **Energy Cost Savings-** Repayment terms would be structured such that the expected energy cost savings will exceed the repayment amount in any given payment cycle. Using this “bill neutral” model, less than one percent of California customers participating in ratepayer-funded OBF programs have defaulted.<sup>118</sup> In leased arrangements, the repayment obligation, as well as the cost savings, can be passed through to the tenant in many cases. Utilities benefit by receiving lenders fees in exchange for providing billing infrastructure and collection services and from increased program participation that contributes to its energy-savings goals (and may generate shareholder incentive payments).
- **Increased Property Value-** High energy-performing buildings have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>119,120,121,122</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### *Implementation Costs and Other Considerations*

- **Implementation Costs and Funding Options-** Utility ratepayer funding, partnerships with community development financial institutions, grant funding, or private capital can be used for loans. Utility budgets or other funding source is needed for program administration and to cover payment defaults. House Bill 1088, introduced during the 2012 legislative session to create a statewide OBF program, identified the EmPower Maryland surcharge and the Jane E. Lawton Conservation Loan Program as potential funding sources. However, the Lawton Loan Program was found to not be an advisable funding source as any redirection of program funds away from the existing low-interest loans made to governments, businesses, and nonprofits to a new OBF program would decrease the amount of money available in the existing revolving loan fund, which currently earns the state interest. Thus, any decrease in the revolving loan fund balance decreases the interest earned. A bill analysis also found that the EmPower Maryland fund currently cannot be used to invest in other programs, though financing could potentially be included as a component of the EmPower Maryland program portfolio.<sup>123</sup>
- **Other Considerations-** While OBF is an attractive financing option, utility resistance can be expected. Common concerns cited by utilities about OBF include:<sup>124</sup>

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<sup>117</sup> Bell, Catherine, Steven Nadel, and Sara Hayes, *On-bill Financing for Energy Efficiency Improvements: A Review of Current Program Challenges, Opportunities, and Best Practices*, Report No. E118, December 2011.

<http://aceee.org/research-report/e118>.

<sup>118</sup> CPUC, *Administrative Law Judge’s Ruling Regarding Energy Efficiency Financing*, 2009.

<sup>119</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>120</sup> IMT, “Energy Efficiency and Property Value.”

<sup>121</sup> Pogue et al., “Do Green Buildings Make Dollars & Sense?”

<sup>122</sup> Finlay and Kok, “Valuing Sustainable Real Estate,” 2011.

<sup>123</sup> Maryland General Assembly, House Bill 1088 Fiscal and Policy Note, Department of Legislative Services.

<http://mlis.state.md.us/2012rs/billfile/hb1088.htm>.

<sup>124</sup> Harcourt Brown & Carey, *Energy Efficiency Financing in California*, 2011.

- Integrating repayment into utilities’ billing infrastructure is a major information technology (IT) project requiring a significant time and monetary investment. This obstacle can be mitigated through timing the introduction of OBF with other IT projects, such as upgrading systems to advanced meter infrastructure, which Pepco and BGE are currently in the process of doing.
- Utilities have to maintain a balanced debt-to-equity ratio, which restricts their ability to hold large volumes of low-return loans. This barrier can be overcome through prudent management of outstanding loans and prompt action (e.g., disconnection of service) in the case of delinquent loans. Alternatively, some utilities are pursuing models that use rate tariffs for delivery of an energy efficiency service rather than a loan.
- Utilities may have to comply with a new set of banking regulations if the funds provided through OBF are treated as a loan rather than a service. This challenge can be overcome through a waiver from applicable state and federal financial regulators.

### ***Communities with Similar Policies/Programs***

At least ten states have taken legislative action to enable or require utilities to offer OBF programs. Others have taken regulatory action through PSCs. New York’s (legislative) and California’s (regulatory) statewide programs are mentioned below:

- State of California: California’s investor-owned utilities currently offer ratepayer-funded OBF programs for nonresidential customers. Customers can borrow up to \$100,000 (commercial and industrial) or \$1 million (institutional) for up to five years at zero interest. Loans must be coupled with the utilities’ other rebates to shorten the payback. The four utility programs have \$41.5 million in authorized capital for 2010 through 2012. Repaid funds go into a revolving loan pool. The California Public Utilities Commission is also considering a statewide OBF program that would use third-party capital while continuing to attachment repayment to utility bills.
  - Pacific Gas and Electric On-Bill Financing program
  - San Diego Gas and Electric On-Bill Financing program
  - Southern California Edison On-Bill Financing program
  - Southern California Gas Company Zero Percent On-Bill Financing program
- State of New York, On-Bill Recovery Financing Program: New York has a statewide OBF program administered by the New York State Energy Research and Development Authority (NYSERDA). The program is currently in place for single family customers and will be available to multifamily and small business customers in summer 2012. NYSERDA underwrites the loans, and customers repay the loans through their utility bill. If a utility disconnects service for non-payment, NYSERDA’s loan servicer will bill the customer directly until utility service is re-connected. The program has several funding sources: a revolving loan fund established through ratepayer funds, proceeds from the sale of carbon allowances under the Regional Greenhouse Gas Initiative, qualified energy conservation bonds, and a DOE Better Buildings grant. Repaid funds are returned to the revolving loan fund. Additionally, NYSERDA reimburses the utilities for their on-bill infrastructure costs, as well as lender fees. Program participation is currently limited to 0.5 percent of each utility’s customers, though this cap will likely be raised.

### 3.9 Energy-Efficient/Green Leasing<sup>125</sup>

This policy type would be used to guide the County's future space leasing process, to help private-sector parties develop a market for energy-efficient leasing in the County, or both. For County leasing practices, this approach might restrict the County from entering into a new or renewed leasing contract on or after a certain date, for buildings with greater than or equal to 10,000 rentable ft<sup>2</sup> that have not earned ENERGY STAR certification for the most recent year.<sup>126</sup> An ENERGY STAR energy performance score of 75 or higher, meaning a building performs more efficiently than 75 percent of its peers, is required to earn the ENERGY STAR. The lease terms must also commit the landlord to maintain the building's ENERGY STAR status for the life of the lease.

For new construction of and major renovations to County-leased buildings greater than or equal to 10,000 rentable ft<sup>2</sup> for which the County is/will be the sole occupant, the County would be required to seek buildings that have been designed to earn the ENERGY STAR within a year of reaching 95 percent occupancy. The U.S. Environmental Protection Agency offers Target Finder as a tool to help building owners and architects design buildings to achieve energy performance goals, such as attaining an ENERGY STAR score of 75 or higher. The lease contract must stipulate that the building owner will furnish the building's ENERGY STAR score after a year's operation at 95 percent or higher occupancy and will maintain its ENERGY STAR status for the life of the lease.

While many typical government buildings (e.g., office buildings, courthouses, warehouses) are eligible to receive the ENERGY STAR, some cannot be evaluated using Portfolio Manager. For buildings for which an ENERGY STAR score cannot be determined, the County may only enter into leasing contracts for buildings with a EUI below a pre-established schedule of acceptable EUIs by building type. Although Portfolio Manager does not generate an ENERGY STAR score for all building types, it can report the EUI for any building for which sufficient utility and building characteristics are provided.

When operating in its capacity as a landlord, the policy would require the County to offer its tenants the same ENERGY STAR leasing provisions that it uses as a tenant. The County would encourage other local governments and tenants within its jurisdiction to follow the County's lead in pursuing these energy-efficient leasing practices.

#### ***Policy/Program Approach***

The County is proposing to introduce ENERGY STAR requirements for properties leased by the County and for which the County is the landlord. In addition to this lead-by-example approach, the County may work with interested private sector stakeholders to adopt similar energy-efficient leasing policies through the County's existing Green Business Certification Program

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<sup>125</sup> Also known as "energy-aligned leasing" and "green leasing", although green leasing typically involved

<sup>126</sup> The ENERGY STAR requirement would be triggered by the size threshold of the building's total rentable space, not the space occupied by the County.

(<http://mcgreenbiz.org/>), proposed Community Energy Challenge, and related outreach initiatives.

While final regulations would include more specifics, the proposed approach would include:

- **Existing Leased Buildings-** The County would be restricted from renegotiating contracts for buildings that are not ENERGY STAR certified (when applicable) or that have an EUI below a pre-established schedule of acceptable EUIs by building type in the most recent year, or that the owner has not agreed to a comprehensive improvement process likely to achieve these levels of efficiency.
  - Landlord must commit to maintain ENERGY STAR status for life of lease.
  - Buildings less than 10,000 ft<sup>2</sup> would be exempted.
  - Other exemptions would be available based on defined criteria such as operational needs or property availability.
  - Requirements would take effect for all new leases one year after legislation.
- **New Construction/Major Renovation Leased Buildings-** The County must seek buildings that have been designed to earn the ENERGY STAR (when applicable) or designed to meet an EUI below a pre-established schedule of acceptable EUIs by building type within a year of reaching 95 percent occupancy.
  - Landlord must furnish the building's ENERGY STAR score after a year's operation at 95 percent or higher occupancy and maintain its ENERGY STAR status for the life of the lease.
  - Buildings less than 10,000 ft<sup>2</sup> would be exempted.
  - Other exemptions would be available based on defined criteria such as operational needs or property availability.
  - Requirements would take effect for all new leases one year after legislation.
- **County-owned Buildings for which County is Landlord-** The County would be required to offer its tenants the same ENERGY STAR leasing provisions that it uses as a tenant.
  - Buildings less than 10,000 ft<sup>2</sup> would be exempted.
  - Other exemptions would be available based on defined criteria such as operational needs or property availability.
  - Requirements would take effect for all new leases one year after legislation.

### ***Implementation Strategies***

To ensure the long-term success of the policy, the County may wish to consider the following implementation strategies:

- **Link with Community Energy Challenge-** The County could implement a voluntary energy challenge in parallel. Complying with the energy-efficient leasing policy could be one way to earn points as part of the challenge, and upgrading the building to earn ENERGY STAR certification could help meet a participant's energy reduction goal.
- The following modifications could be made to the energy-efficient leasing policy as currently described to ease the stringency of the requirements or expand the scope of the policy:

- Raise the threshold for minimum building size exemption to minimize the number of buildings and stakeholders affected
- Exempt LEED certified buildings for new construction/major renovation and/or existing leased buildings to incent green building practices that may already include energy-efficient technologies and operations
- Delay effective dates by a year or more to allow affected stakeholders more time to prepare for the policy
- Require buildings to document an ENERGY STAR score of 75 or higher rather than seek ENERGY STAR certification, which incurs application costs but has educational and recognition value
- Expand the scope of the policy to include other green building principles (e.g., LEED certification, water efficiency performance targets and tracking, provision of recycling and composting services) to align with other sustainability goals

### ***Target Audience and Key Stakeholders***

The target audience of the policy includes Montgomery County, as a tenant of privately owned buildings and as a landlord of publicly owned buildings, and building owners and managers that lease property to Montgomery County. Buildings greater than or equal to 10,000 ft<sup>2</sup> in size would be affected. Other affected stakeholders may include the following:

- Other public and private building owners and managers and tenants could adopt similar energy-efficient leasing strategies.
- Interest groups that represent property managers, real estate professionals, tenants, and energy service providers could help educate landlords and tenants.
- Utility companies could provide technical assistance and incentives for identified energy efficiency projects enabled by energy-efficient leases.

### ***Performance Measurement***

Potential performance measures to track include:

- Number and percent of buildings leased by the County that comply with the policy
- Number and percent of County-owned buildings for which the County acts as landlord that comply with the policy
- Number and percent of private sector buildings that have voluntarily adopted the policy

### ***Benefits and Costs***

#### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** ENERGY STAR certified buildings perform in the top quartile of all buildings nationwide in terms of how efficiently they use energy. Improved energy

performance translates to reduced energy consumption: ENERGY STAR certified buildings typically use 35 percent less energy than average buildings.<sup>127</sup>

- **Energy Cost Savings-** ENERGY STAR certified buildings operate more efficiently, thereby affording property owners and tenants up to 30 percent lower energy bills<sup>128</sup> and costing \$0.50 less per square foot to operate.<sup>129</sup>
- **Increased Property Value-** In addition, high energy-performing buildings, such as those that have earned the ENERGY STAR, have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>130,131,132,133</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### *Implementation Costs and Other Considerations*

- **Implementation Costs and Funding Options-** ENERGY STAR certified buildings command a higher rental rate: one recent study cited an average rent premium of 5 percent, after controlling for other variations in rent determinants.<sup>134</sup> Assuming the lease is structured so that the tenant pays the utility bills, the added costs are offset by the up to 30 percent lower operating costs for ENERGY STAR certified buildings.<sup>135</sup> The County may incur some minimal cost in developing standard ENERGY STAR lease language and educating stakeholders on energy-efficient leasing benefits and practices.
- **Other Considerations-** Occupying ENERGY STAR certified buildings can enhance the County's reputation as a good steward of taxpayer dollars, finite energy resources, and the environment. Demonstrating the benefits of the County's commitment to fiscal and energy conservation can encourage the private sector to follow the County's lead. If the scope of the policy were expanded to include other non-energy sustainability features (e.g., non-landfill waste disposal options, alternative transportation availability), the costs and benefits would likely increase.

### *Communities with Similar Policies/Programs*

Other jurisdictions that have adopted energy-efficient leasing policies include the following:

- New York City, New York, Model Energy Aligned Lease Language (part of the Greener, Greater Buildings Plan): New York City provides standard lease language for sharing energy

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<sup>127</sup> EPA, "Apply for the ENERGY STAR for Your Buildings."

<sup>128</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>129</sup> EPA, "Apply for the ENERGY STAR for Your Buildings."

<sup>130</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>131</sup> IMT, "Energy Efficiency and Property Value."

<sup>132</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>133</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

<sup>134</sup> Fuerst, Franz and Patrick McAllister, "New Evidence on the Green Building Rent and Price Premium," presented at the Annual Meeting of the American Real Estate Society, Monterey, California, April 3, 2009.

<http://www.henley.reading.ac.uk/rep/fulltxt/0709.pdf>.

<sup>135</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

efficiency improvement costs and savings between landlord and tenant. The language was developed in partnership with industry and applied to all applicable leased public buildings.

- State of Washington, Senate Bill 5854 (Enabling Legislation, Lease Language): The legislation restricts the state from entering a new lease or renewing an existing lease for a building with an ENERGY STAR energy performance score of less than 75 (equivalent to ENERGY STAR certification), unless efficiency measures are implemented within the first two years of the lease.
- U.S. General Services Administration, Green Lease Policies and Procedures: The GSA restricts federal agencies from entering into new leases for buildings larger than 10,000 ft<sup>2</sup> that have not earned ENERGY STAR certification in the most recent year. Requires LEED Silver certification for lease new construction and major lease renovation projects for buildings that are larger than 10,000 ft<sup>2</sup> when the federal government is the sole occupant.

### 3.10 Energy Efficiency Rebate and Grant Programs

The proposed program element would include leveraging ratepayer-funded incentives administered by utilities to facilitate investment in energy efficiency in conjunction with participation in Montgomery County's energy programs and policies. Pepco, for example, offers a number of commercial energy efficiency programs, including rebates for energy-efficient equipment, energy audits, and RCx and training and technical assistance on operations, maintenance, and benchmarking. Pepco delivers these programs to meet the energy reduction goals set by the EmPOWER Maryland legislation, which mandates that utilities reduce energy consumption by 15 percent by 2015. The County's natural gas utility, Washington Gas, does not currently offer energy efficiency incentives, though it does promote energy-saving tips on its website.<sup>136</sup>

The County could leverage utility programs to facilitate investment in building improvements as part of the Community Energy Challenge and other County energy efficiency initiatives. The County could also provide new incentives, such as grants or rebates that complement and encourage participate in utility programs.

#### *Policy/Program Approach*

As an example of local utility programs, Pepco's Commercial and Industrial (C&I) Energy Savings Program<sup>137</sup> includes the following program elements that could help businesses pursue energy efficiency upgrades and improve building energy performance:

- **Lighting and Controls-** Pepco offers prescriptive and custom incentives for the replacement of less efficient lighting technologies with more efficient models.
- **Other Commercial Building Equipment-** Pepco offers incentives that reduce the upfront cost of high efficiency equipment including variable frequency drives; packaged heating, ventilation, and air conditioning (HVAC) systems; chillers; water heaters, a range of electrical controls, and commercial refrigeration and kitchen equipment.

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<sup>136</sup> To view Washington Gas' energy efficiency tips, visit <http://www.washgas.com/pages/EnergyEfficiencyEnergyAssistance>.

<sup>137</sup> For more information about Pepco's C&I program offerings, visit <https://cienergyefficiency.pepco.com/>.

- **Energy Assessments-** Pepco's energy studies help C&I customers evaluate the energy performance of their facilities and identify energy-savings opportunities. Incentives are offered for a simple walk-through energy assessment and detailed energy savings study, both of which require completion of energy savings and benchmarking reports.
- **Continuous Energy Improvement-** Pepco offers incentives for various continuous energy improvement activities, including HVAC tune-up, RCx, enhanced commissioning, and building operator and tenant training.
- **Custom Incentives-** Pepco offers custom incentives for customer-defined projects that produce minimum annual energy savings of 25,000 kilowatt-hours. Potential projects include the implementation of energy management systems, building automation systems, compressed air system improvements, and industrial process improvements.
- **New Construction-** New construction and major renovation projects are eligible for incentives for energy efficiency equipment and projects that exceed the Maryland State Energy Code efficiency requirements. Pepco also offers technical assistance, including reviewing design plans and equipment specifications and more comprehensive design assistance for larger construction projects and those that are seeking LEED certification.

Pepco offers the above programs for all C&I customer types and also has targeted program offerings for small businesses and multifamily property owners. Pepco has existing marketing materials, but may be open to working with Montgomery County to develop or provide input on outreach materials for County initiatives. Pepco would benefit from the County's promotion of its programs to help drive program participation and meeting the utility's energy-savings goals.

### *Implementation Strategies*

The County may want to consider the following strategies to increase the reach and effectiveness of Pepco's energy efficiency programs and supplement the lack of equivalent gas efficiency programs:

- **Education and Outreach-** The County could develop sector-specific outreach materials and provide County staff to help promote Pepco's existing energy efficiency programs and incentives. Small businesses face greater barriers in accessing capital and staff resources to implement energy efficiency projects, so small businesses in particular could benefit from increased education and technical assistance from the County. For larger businesses and buildings, the County could encourage participation in utility programs. For example, the County could direct affected building owners to Pepco's RCx and training programs to help comply with the County's energy assessment/RCx program.
  - One emerging community-utility partnership model is the use of community energy advisor(s), who could be funded by the government or the utility, to provide a grassroots approach to educating businesses about energy efficiency opportunities and available resources. For example, We Energies has partnered with the Town of Burlington, Wisconsin, to offer an energy ambassador who visits business one-on-one, makes presentations to chambers of commerce and other business and

- community groups, and participates in a Town-appointed task force to oversee progress towards community energy-savings goals.<sup>138</sup>
- The County could also consider providing additional training beyond what Pepco currently offers to reach more stakeholders about the importance of and process to benchmark. For leveraging Pepco programs in the Community Energy Challenge, it may be helpful to align actions that give participants points with available incentives from Pepco.
  - **Complementary Incentives-** To drive the deep energy savings that the County is after, building owners would most benefit from access to information about electricity *and* natural gas savings opportunities. For compliance with the benchmarking and disclosure policy, building owners will also need access to energy consumption data for both fuels. Therefore, the County could play a role in encouraging Washington Gas to more actively promote energy efficiency and support PSC direction in offering ratepayer-funded energy efficiency programs. In the absence of incentives and technical support from Washington Gas, the County could help fill this void by offering gas rebates and assistance that complement utility program offerings.

### ***Target Audience and Key Stakeholders***

Montgomery County would engage multiple stakeholders to determine the most effective ways to leverage utility programs. Key stakeholders could include:

- Utility executives, energy efficiency program managers, and key account managers could help advise the County in the design and implementation of its policies and programs. Utilities may be able to assist with marketing materials, delivering trainings to Commercial and Industrial customers, connecting building owners with available utility programs and resources, and addressing common barriers to meeting eligibility requirements for its incentives.
- Commercial building owners and managers, energy service providers, and their respective associations could provide feedback on policy and program design to receive the widest stakeholder support and participation. If the County chooses to offer additional incentives, these stakeholders (as well as the utilities) could provide feedback on which projects have the largest upfront cost barriers but promise the largest energy savings.
- The PSC would likely need to be engaged in any discussion about new utility energy efficiency programs or modifications to existing programs.

### ***Performance Measurement***

Potential performance measures to track include the following:

- Number of program participants
- Number and type of energy efficiency upgrades completed through participation in incentive programs

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<sup>138</sup> For more information about the Way to Save! Burlington program, visit <http://www.waytosaveburlington.com/>.

## ***Benefits and Costs***

### ***Energy, Economic, and Greenhouse Gas Reduction Benefits***

- **Avoided Energy Use-** Energy savings will vary by project, but promoting existing utility energy efficiency programs is a low-cost way for the County to help drive energy savings. Utilities also benefit from increased program participation, which helps achieve PSC-mandated efficiency goals.
- **Energy Cost Savings-** Energy cost savings will also vary by project, but by nature of the ratepayer funding of utility programs, energy savings accomplished with rebate funding must be cost-effective according to PSC standards. By incorporating electricity and gas savings, building owners can benefit from larger energy cost savings.
- **Increased Property Value-** Buildings that participate in utility programs may sufficiently improve building energy performance that they qualify for ENERGY STAR, LEED, or other certification. Buildings that have been recognized for their energy performance have been documented to increase occupancy levels, lease rates, and sale prices relative to less efficient properties.<sup>139,140,141,142</sup> These benefits flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market.

### ***Implementation Costs and Other Considerations***

- **Implementation Costs and Funding Options-** County staff could provide information about available utility incentives and training opportunities through their regular outreach with building owners and other stakeholders who interact with the County through its other energy efficiency policies and programs. Thus, promotion of available utility programs would not have a significant fiscal impact to the County. If, however, the County were to offer additional technical assistance or rebate or grant funding to complement the utility offerings, larger expenses would be incurred. Fines collected for non-compliance with some of the other mandatory policies under consideration could be used to create County-provided incentive funding.

### ***Communities with Similar Policies/Programs***

- Denver (City and County), Colorado, and Xcel Energy, Denver Energy Challenge: Through the Denver Energy Challenge, Denver was able to engage Xcel Energy in a partnership where Denver included the utility rebates and training as a prominent part of its energy challenge. Denver worked closely with Xcel Energy's Business Solutions Center to help reach small businesses that have been more challenging for the utility to reach. Denver also offers supplemental rebates that piggyback off of Xcel Energy's incentives.

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<sup>139</sup> EPA, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, 2006.

<sup>140</sup> IMT, "Energy Efficiency and Property Value."

<sup>141</sup> Pogue et al., "Do Green Buildings Make Dollars & Sense?"

<sup>142</sup> Finlay and Kok, "Valuing Sustainable Real Estate," 2011.

- Burlington, Wisconsin, and We Energies, Way to Save, Burlington!: We Energies partnered with the Town of Burlington to offer an energy ambassador who visits business one-on-one, makes presentations to chambers of commerce and other business and community groups, and participates in a Town-appointed task force to oversee progress towards community energy-savings goals. The energy ambassador serves as a trusted advisor in the community and helps drive participation in We Energies' existing energy efficiency programs.

## Job Creation and Emissions Reduction Effects

While the scope of this Study does not include detailed analyses of the economic and environmental impacts of these policies, some rough estimates are available for job creation potential and air pollutant/greenhouse gas emission reduction potential.

- **Job Creation-** Investing in energy efficiency can contribute to stable, long-term economic growth and encourage job creation at an estimated rate of five to 15 green jobs per \$1 million invested.<sup>143</sup> Energy efficiency services companies operating in New York City and San Francisco, for example, are seeing a 30 percent increase in business in response to local benchmarking ordinances.<sup>144</sup>
- **Avoided Emissions-** As efficiency improvements occur as a result of increased awareness of energy performance and energy-saving opportunities, the resulting reductions in energy use will create environmental benefits in the form of reduced air pollutant and greenhouse gas emissions, both from buildings' onsite combustion equipment and from utility power plants. For every 1 megawatt-hour (MWH) avoided, 1,300 pounds of carbon dioxide-equivalent and nearly 7 pounds of acid rain and smog-forming pollutants (nitrogen oxides and sulfur dioxide) are also avoided.<sup>145</sup>

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<sup>143</sup> EPA, *RDEE Toolkit: Planning & Implementation Guides*, 2009.

<sup>144</sup> Hurley, Amanda Kolson and Andrew Burr, "Building Energy Disclosure Laws Push Companies to Hire." [http://www.bepanews.com/images/pdf/Disclosure\\_Laws\\_Push\\_Companies\\_Hire.pdf](http://www.bepanews.com/images/pdf/Disclosure_Laws_Push_Companies_Hire.pdf).

<sup>145</sup> EPA, eGRID2010 Version 1.1.

## 4.0 Stakeholder Outreach and Feedback

ICF conducted stakeholder outreach as part of the Study to learn more about how stakeholders think about and act on energy efficiency, to get their insights on the best ways to overcome market barriers, and to hear their feedback on the policy and program options analyzed in the Study for meeting the County's 25% savings goal for the commercial and multifamily sector.

Key elements of the process include:

- A survey effort using a detailed, online survey instrument;
- A series of in-depth interviews with a range of stakeholders;
- Invitation to comment on this draft report in writing; and
- A public forum for oral comment on the report and the Study overall.

ICF team members, with assistance from County staff, also consulted informally with many stakeholders as part of the data collection and policy development process.

### 4.1 Survey Methodology

The survey was conducted online from March 26, 2012 through April 30, 2012. ICF and County Staff identified over 200 individuals to invite to participate in the survey, with the goal of ensuring that a broad and balanced range of stakeholders were included. Additional stakeholders requested and received survey links from ICF after hearing about the survey from colleagues or others.

In total, 242 stakeholders received links to the survey. 88 stakeholders (36% of the total sample) responded and were included in the analysis. This represents everyone who completed the survey or who answered at least one substantive question (beyond question two of the survey—a text version of the survey instrument is found in Appendix B).

Note that, due to the non-random nature of the sampling of participants, the results presented should be viewed as directional in nature and should not be generalized as statistically meaningful or predictive. While the 36% response rate demonstrated active stakeholder interest in these issues, the absolute number of respondents was too small to give statistical significance to the results. For example, many of the “base sizes” (numbers of people responding to a specific question) presented in the results are under 35. The smaller the base size, the more a single respondent's answers can influence the aggregate statistics.

Statistical limitations notwithstanding, the survey represents a broad and balanced range of views and experience in the markets affected by the study. Of the 88 individuals who responded to the survey, 54 (61%) owned and/or managed buildings in Montgomery County (referred to throughout this report as “Owners/Managers”). Another 34 (39%) also participated in the survey (referred to as “Other Stakeholders”). These respondents leased or rented spaces in buildings in the County, provided services to commercial buildings in the County, or were otherwise interested in potential County energy efficiency policies.

Figure 36 summarizes the respondents by type, including building owners, managers, and other stakeholders. More than half of the respondents (61%) are owners, managers, or both, lending confidence to the notion that the survey should be focused primarily on those most affected by potential County policies and programs.

**Figure 36. Survey Respondents: Owners/Managers vs. Other Stakeholders**

<b>Involvement in Montgomery County Buildings</b>	<b>(n=88)</b>	
<b>Owners/Managers</b>	<b>54</b>	<b>61%</b>
Own Only	14	16%
Manage Only	21	24%
Both Own <u>and</u> Manage	19	22%
<b>Other Stakeholders</b>	<b>34</b>	<b>39%</b>
Lease/Rent Space	11	13%
Provide Services to Commercial Buildings	8	9%
Lease/Rent Space <u>and</u> Provide Services	2	2%
Other	13	15%

Figures 37 to 39 further break down the demographics of the respondents. Figure 37 shows the types of organizations the respondents represent. Figure 38 shows the breakout of building types owned or managed by the owner/manager subset of the sample. Office buildings predominate, as would be expected, followed by multifamily buildings. Figure 39 shows the distribution of owner/managers by building type; it indicates that the respondents represent a wide range of smaller as well as medium and large buildings.

**Figure 37. Survey Respondents by Organization Type**

<b>Sector</b>	<b>TOTAL (n=88)</b>
Association	5%
Energy Services	9%
Faith-Based Organization	9%
Financial Services	3%
Government (State)	1%
Government (Local)	3%
Large Commercial	1%
Small/Medium Commercial	14%
Multifamily Property	15%
Non-Governmental Organization	10%
Property Owner/Management	24%
Utility	2%
Miscellaneous	2%
Unknown	1%

**Figure 38. Survey Respondents by Primary Building Type**

<b>Primary Building Usage Type</b>	<b>Owners/ Managers (n=54)</b>
Office	56%
Retail	9%
Warehouse/Storage	2%
Health Care	7%
Hotel/Lodging	7%
Religious Worship	15%
High-Rise Multifamily Residential (5+ stories)	15%
Low-Rise Multifamily Residential (1-4 stories)	13%
Other	13%

**Figure 39. Survey Respondents by Building Sizes**

<b>Own Or Manage at Least One Building of This Size</b>	<b>Owners/Managers (n=51)</b>
Smaller than 10,000 sq. ft.	28%
10,000-49,999 sq. ft.	37%
50,000-99,999 sq. ft.	33%
100,000 sq. ft. or larger	59%

## 4.2 Survey Results

Respondents as a whole were generally positive about the majority of the ten policy and program types included in the survey, though views varied substantially between categories. Figure 40 summarizes respondents' favorability ratings of the ten policy categories, in order of mean (average) rating.

**Figure 40. Summary of Respondent Favorability Responses to Policy Categories**

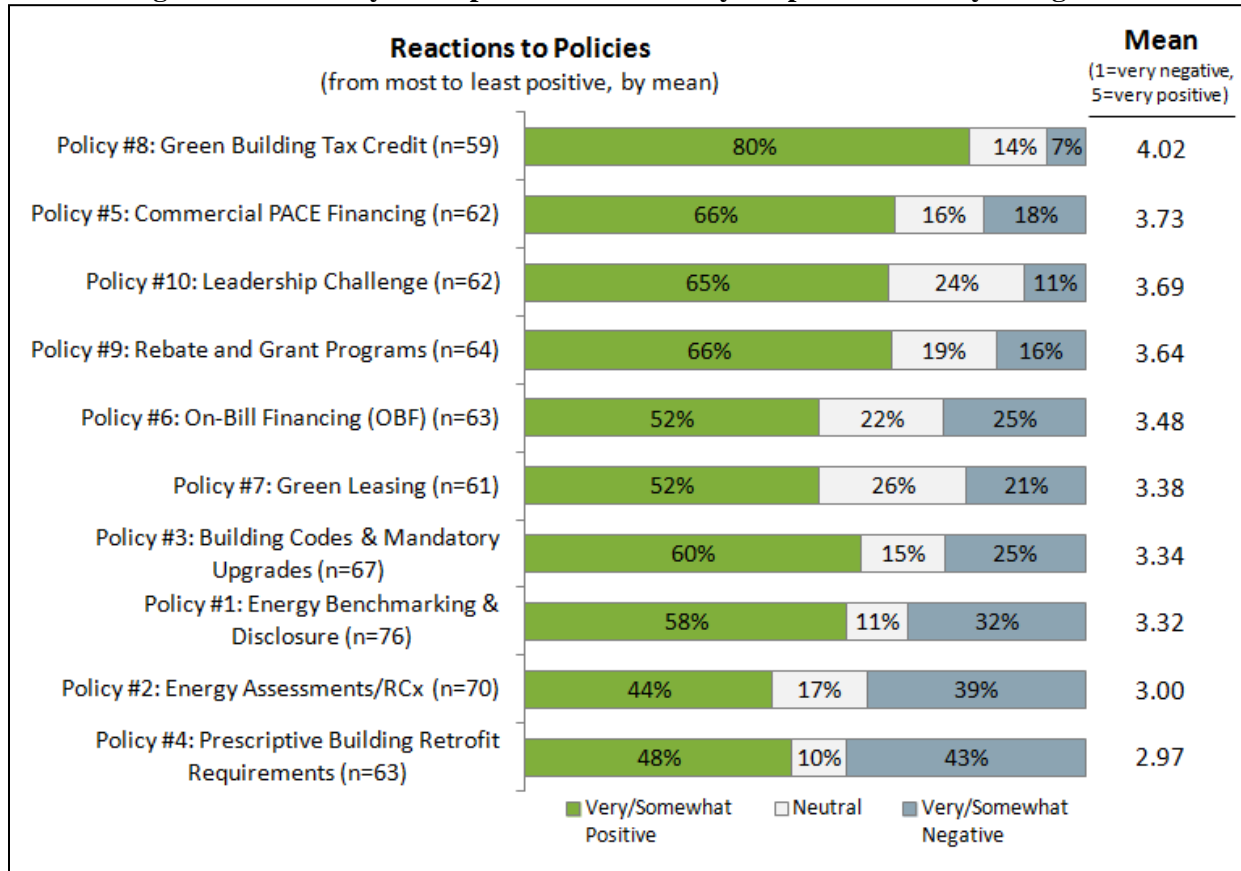
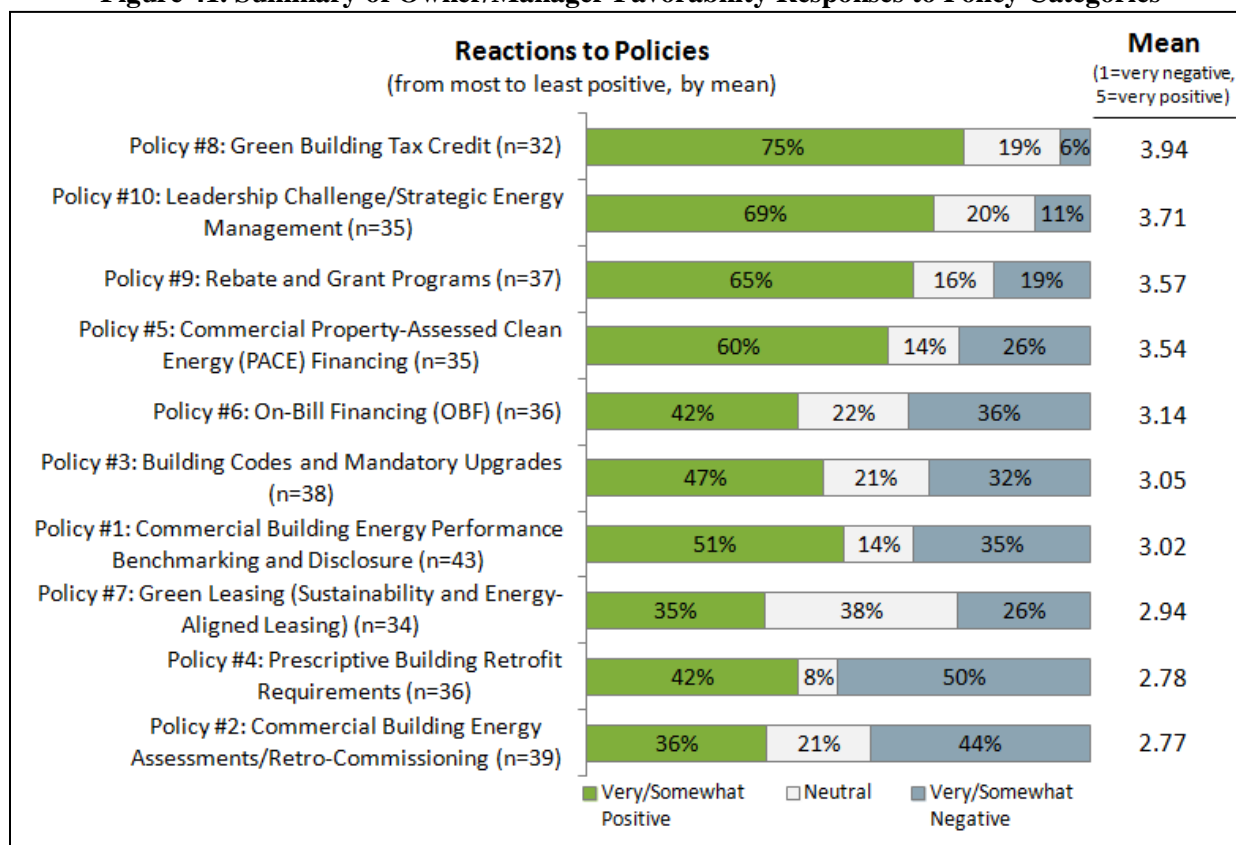


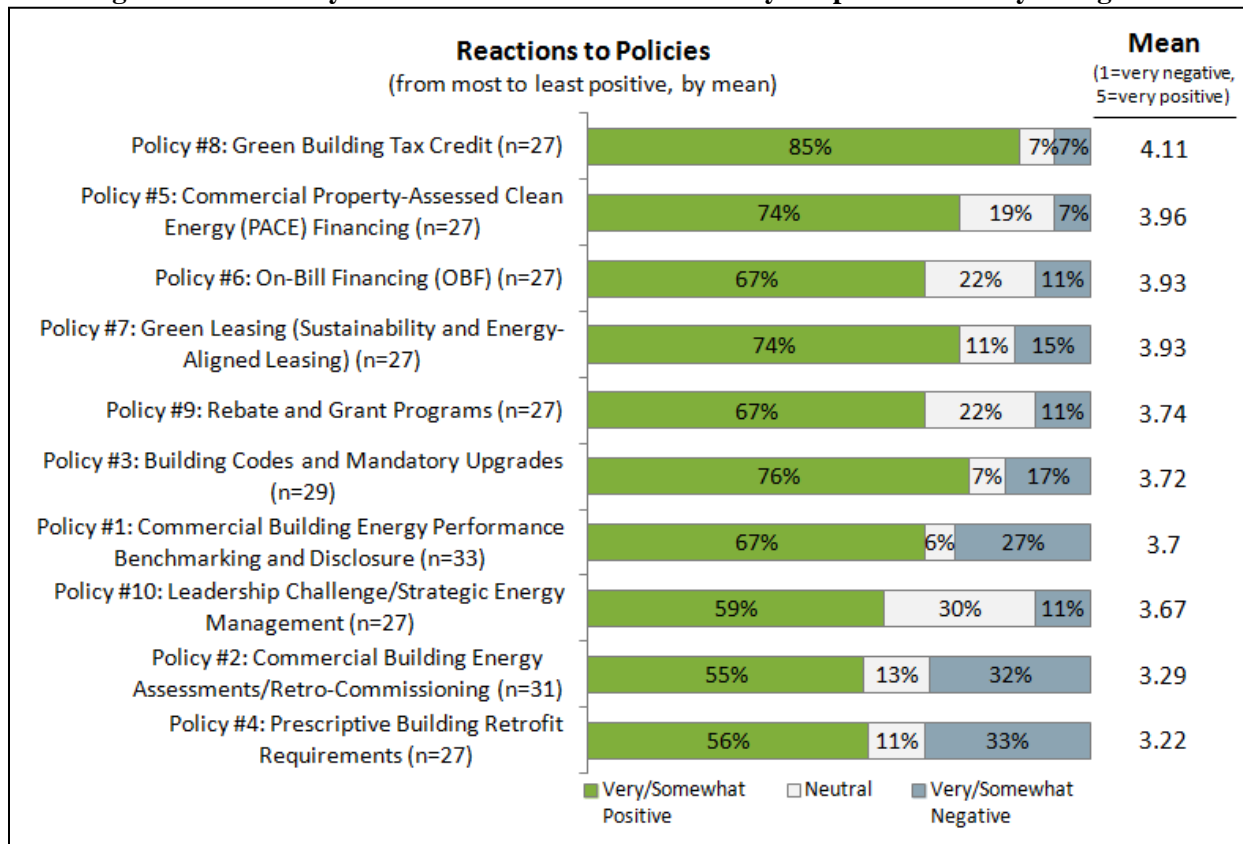
Figure 40 shows that more than half of respondents felt very positive or somewhat positive about eight of the ten policy categories. The top three policies were Green Building Tax Credits, PACE, and voluntary leadership challenges. The bottom two policies were prescriptive building retrofits and energy audit/retro-commissioning requirements. While the survey comments, reinforced by interviews, indicated that many owners and managers do not favor regulatory policies, two of the four regulatory categories—building codes and benchmarking/disclosure—showed positive ratings from the majority of the full sample. More detail on survey respondents' views on individual policies is found in Appendix B.

Owners/Managers and Other Stakeholders had somewhat differing views on the policies, as shown in Figures 41 and 42. The Green Building Tax Credit was the most favorable policy among both groups. While the relative ranking of the policies varied between the two groups, Other Stakeholders were generally more favorable of the policies presented.

**Figure 41. Summary of Owner/Manager Favorability Responses to Policy Categories**



**Figure 42. Summary of Other Stakeholder Favorability Responses to Policy Categories**

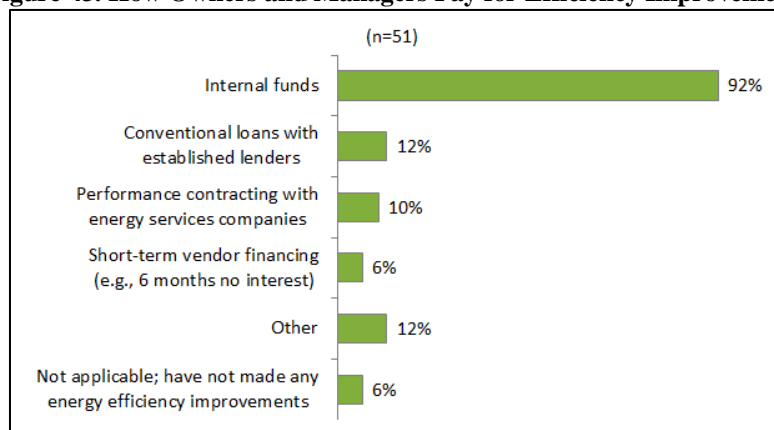


### 4.3 Other Survey Findings

The survey asked building owners and managers additional questions about how they pay for energy efficiency, whether and how they measure and report energy use, and about their participation in utility energy efficiency programs. Figures 43-48 summarize those responses.

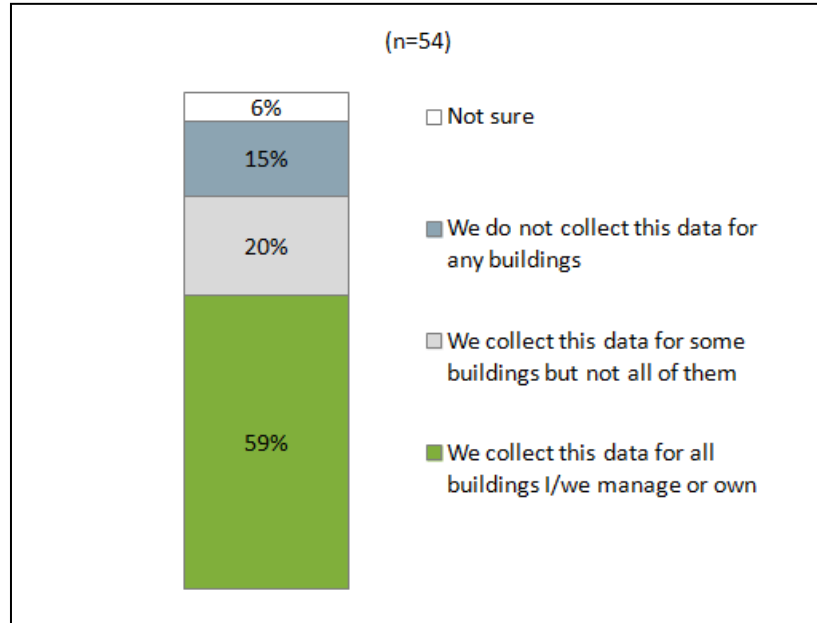
In Figure 43, the graphic shows that over 90% of owners/managers use internal funds to pay for efficiency improvements; no more than 12% report using any specific kind of financing.

**Figure 43. How Owners and Managers Pay for Efficiency Improvements**

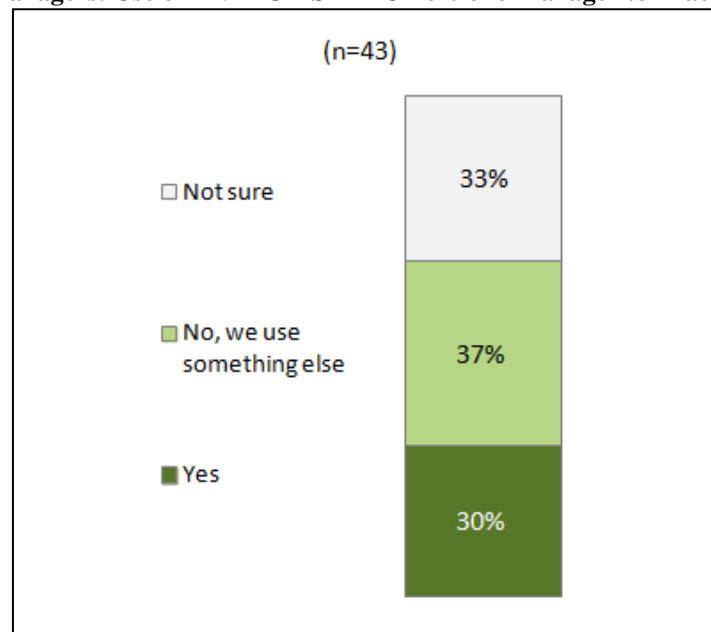


As seen in Figure 44, about 80% of owners and managers report collecting energy usage data for at least some of their buildings. Given that the respondent sample includes owners/managers across a range of building types and sizes, this is somewhat surprising. The survey was not designed to ask, however, in what form or frequency the data is collected, or many specifics on how the data is used. Figure 45 shows that 30% of those who collect such data report using the Portfolio Manager software, which is the most commonly-used software for benchmarking programs, both voluntary and mandatory. However, a greater number (37%) report using other methods.

**Figure 44. Owners'/Managers' Experience Collecting Energy Usage Data**

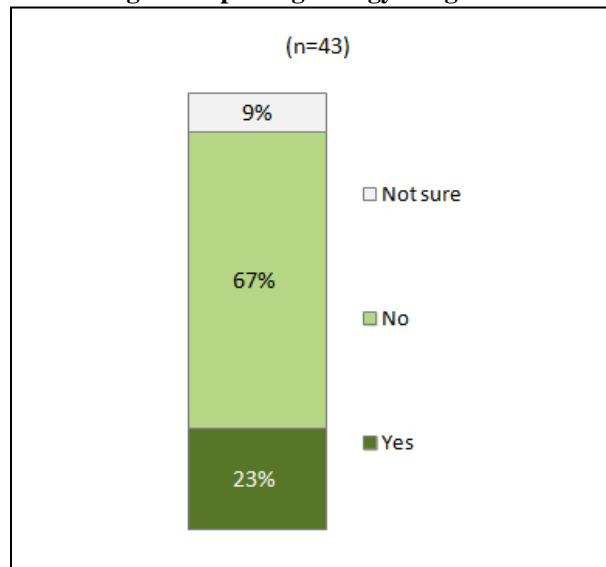


**Figure 45. Owners/Managers: Use of ENERGY STAR® Portfolio Manager to Track Energy Consumption**



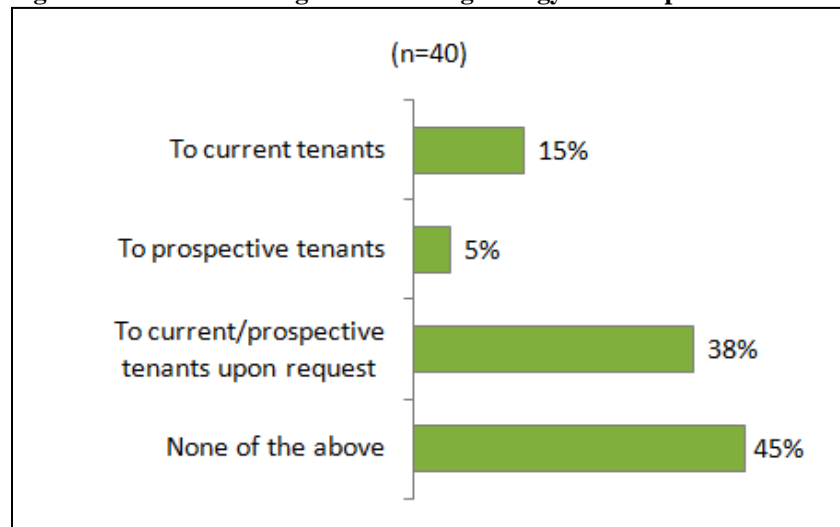
As seen in Figure 46, 23% of those who collect this data say they report energy usage data outside the company. Figure 47 shows typical ways that data is reported to prospective and current tenants.

**Figure 46. Owners/Managers: Reporting Energy Usage Data Outside the Company**



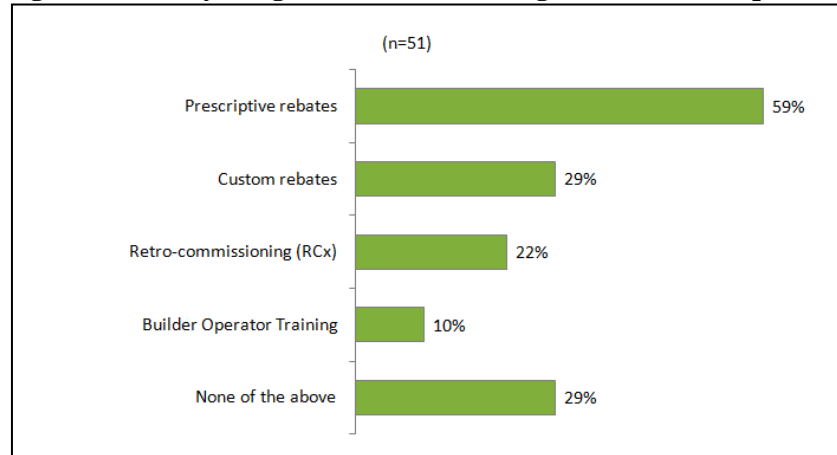
The most common practice for tenant disclosure of energy information appears to be not to disclose. However, of those that do disclose, the most common avenue is on an as-requested basis.

**Figure 47. Owners/Managers: Disclosing Energy Consumption to Tenants**



Of owner/manager respondents, 71% (36 of 51) reported participating in at least one utility program. Figure 48 shows the distribution of program types they participated in. While 29% reported “none”, most participants reported participating in at least one utility program. Prescriptive rebates were by far the most common program type reported, which would comport with most utility program portfolio participation rates.

**Figure 48. Utility Programs Owners/Managers Have Participated In**



## 4.4 Interview Process

ICF contacted more than 60 stakeholders representing a diverse cross-section of the affected property owners in the County to provide in-depth feedback on the policies and programs under consideration. ICF completed 30- to 45-minute interviews with 33 stakeholders (52 percent response rate). The private real estate, development, hospitality, health care, faith-based, education, and energy communities and the public sector were represented. Figure 49 summarizes the number and types of stakeholders contacted and interviewed.

**Figure 49. Montgomery County Stakeholders Contacted for Interviews**

Category	No. Organizations Contacted	No. Interviews Completed
Association/NGO	11	6
Commercial Property Owner/ Manager	10	6
Commercial (tenant –Large)	5	3
Commercial (tenant)-Small/ Medium	4	0
Development/Construction Company	1	0
Education	1	1
Energy Services Company	6	2
Faith-Based Organization	3	1
Financial Services Company	5	3
Government-Federal	2	1

Government-Local	1	1
Government-State	3	3
Multifamily Property Owner/ Manager	8	4
Utility Company	3	2
<b>TOTAL</b>	<b>63</b>	<b>33</b>

## 4.5 Interview Results

The views expressed in the interviews were overall in line with the survey results reported earlier. The same overall patterns of favorability showed up, although with much more nuanced and thoughtful responses in many cases. What was most useful in the interview response was a number of insights into the specific policy/program design and implementation issues involved with specific policy categories.

In the following subsections ICF has summarized the most common and significant comments. As with the survey responses, all individual attribution is removed to protect the confidentiality of the process and the privacy of the individuals who gave their time and spoke candidly. In this section, ICF does not draw simple conclusions from these interview comments, as they do not always lead in a single consistent direction on a given issue. However, they do provide a number of helpful insights, which show up in the policy summaries above, in the conclusions and recommendations at the end and in the Executive Summary of this report. They also serve to guide County decision-makers' considerations going forward as they deliberate future action on these issues.

### *Overall Comments*

- A U.S. General Services Administration (GSA) employee indicated that many of the policies that the County is considering pursuing (benchmarking, RCx/audits, retrofit requirements, green leasing) align with existing federal requirements, and GSA is willing to help County building owners/managers implement such requirements through sharing case studies and lessons learned.
- GSA also indicated that County policies/programs that help commercial building owners improve the energy performance of buildings consistent with federal policies will make those buildings more likely to be eligible for federal leases. This can make the County more competitive in the regional market for federal jobs.
- Staff at local Chambers of Commerce, condo association officers, and association staff representing builders and building owners and managers said that they were not supportive of policies that would be mandatory for businesses. Some emphasized that the County should focus first on educating building owners on ways to save energy and reduce energy spending.
- Several people working in multifamily markets spoke about the need for the County to better define "multifamily," and classify buildings in the multifamily sector more clearly as residential or commercial. There was a general consensus among these people that multifamily should be considered "residential."

- An executive at a housing nonprofit expressed that he was not in support of any “unfunded mandates,” and recommended that there be funding provided and/or exceptions provided in every mandatory policy.
- A Global Director of Sustainability at a real estate investment/asset advisory firm liked the fact that many are policies being considered. “With an aggressive savings goal, you need a lot of tools in the toolkit...and all of these have some applicability to various audiences.”
- Numerous people commented that if the County is going to mandate energy performance policies, it needs to lead by example and demonstrate that it is doing this for its own buildings – not just calling on the commercial sector to drive savings.
- Several commenters said that in evaluating these policies, the County must recognize that commercial building owners are already facing an array of County environmental regulations. For instance, the County already has the most stringent storm water management standards in the state.
- Several commenters said that the County needs to recognize that if businesses continue to be faced with additional regulations, they can always choose to re-locate to different counties in MD, or in VA.
- A Senior Managing Director at a large national real estate management firm said that voluntary initiatives will bring in the early adopters, but regulations are needed to move the rest of the market. This same respondent said that the New York City set of policies provides a good model. The package of requirements (benchmarking, disclosure, audits, and upgrades) drives the full range of action, from assessment to implementation.

### ***Mandatory Benchmarking and Disclosure***

- Several commenters said to succeed, a benchmarking policy needs the local utility must be on board to provide energy consumption data to building owners/managers. This is especially true if multi-tenant, individually-metered buildings are to be covered. Devising a simple, automated benchmarking software solution for both gas and electricity billing data would be ideal.
  - Some commenters pointed out that utilities’ Advanced Metering Initiative deployment requires them to upgrade customer information and meter data management systems. This could be an opportunity to add automated benchmarking capabilities.
  - It was also pointed out that Pepco’s new RCx program requires benchmarking as part of the program, so that if the County wanted to launch the benchmarking initiative on a voluntary basis, it could leverage the Pepco program’s resources for that purpose.
  - One commenter suggested that the DC and MD utility commissions, and/or the city/council councils, should confer and coordinate their policies on data access, so that utilities and their customers will have a single set of requirements and capabilities.
- Several owners and managers and their representative organizations said they would prefer voluntary benchmarking over mandatory, and if the policy were mandatory, would prefer benchmarking as mandatory, but disclosure as voluntary.

- Some commenters recommended that the County harmonize its programs as much as possible with nearby jurisdictions, and with other jurisdictions around the country. This was particularly true with respect to the DC benchmarking policy, as many owners/managers deal with both jurisdictions. This would include software requirements, building size and type coverage, and phase-in dates for buildings of different sizes/types. For example, the County might choose to defer multifamily benchmarking requirements until data access issues are fully addressed.
- Several commenters recommended that the County provide sufficient funding, especially for County costs in implementing the program, but also to support affected stakeholders in complying with the requirements.
- Some commenters recommended keeping the building size threshold at or above 50,000 square feet, on the rationale that the great majority of commercial space can be reached at that level, and that owners/managers of larger buildings are more likely to be capable of effective response to such requirement.
- Commenters that had recently bought older buildings and were fixing them up pointed out that their benchmarking scores would look low if they were forced to disclose immediately. Some recommended that a County benchmarking policy allow for disclosure deferrals for a 1-3 year period, on request, to allow new owners to upgrade energy performance.
- Business associations pointed out that County businesses already have a large paperwork burden from existing requirements, and are concerned that a benchmarking policy would be too onerous for businesses.
- A condo association president in a multifamily building mentioned that individually metered multifamily properties would have trouble complying with this policy, due to the difficulty of obtaining data from all tenants in the building. A SVP of Property Management at a large national property management firm said that it will be important to shield owners of multi-tenant office properties from liability if the individual tenants are not willing provide utility data.
- Though generally against mandatory policies, one multifamily condo association president said that he thought benchmarking and disclosure regulations were a good idea, because they would help building owners and managers see where they stood among similar buildings.
- One respondent supported public disclosure, but said it is important to have a phase-in period before benchmarking scores are available to the public. Another respondent, however, said that disclosure should begin as soon as possible: “Peer pressure is a wonderful thing. If you give them a year moratorium, they’re going to waste it. Bad news only gets worse the older it gets.”
- A SVP of Engineering at large national real estate development and management firm said that it will be critical to engage brokers to leverage the benchmarking requirement to drive action by tenants and buyers. Tenants listen to their brokers first and foremost, so if they are not able to communicate what a given rating means, the message will be lost.
- One commenter would like to see the reporting system be tied into Portfolio Manager and the emerging DOE SEED Platform, in order to reduce input burden both for owner/managers and for the County.

### ***Mandatory RCx /Audits***

- Chamber of Commerce and building industry association staff and some building owners/managers emphasized that not all businesses in the Montgomery County area have the funds to comply with a mandatory policy, and thought it would be costly to require audits every five years.
- A multifamily condo association president felt strongly that a policy prescribing assessments every five years would be too expensive (and that every five years was too frequent) for participants in the multifamily sector. Instead, he recommended providing a rebate for building owners that perform energy audits.
- Another multifamily condo association president did not support the mandatory nature of this policy, but thought that performing energy assessments every five years was a good idea.
  - He mentioned that it would be helpful to (if possible) align audits with the budget cycle, so that budgets could be based upon assessments of energy consumption and necessary upgrades.
  - He also said that it would be beneficial for buildings like his to be able to obtain objective opinions on audit results, and he would like to see the County offer a service like that.
- A project manager at a property management firm shared that he would support an RCx/Audit policy, but recommended that the County allow sufficient time to complete requirements, and a multi-year phase-in period.
- The President of an energy services company focusing on residential properties in MD said that for condominiums, reserve studies are already required by law every five years (i.e., how much capital the building needs to have on hand to pay for repairs). This could be a potential opportunity to do an energy assessment; the County could create a standardized list of measures that should be included, so that reserve studies incorporate something like an energy audit.

### ***Mandatory Building Codes and Retrofits***

- Building industry association staff expressed opposition to more stringent codes, as their members must advance the capital costs, while benefits flow to tenants later. This would raise County real estate prices and rents, and could drive building activity into other parts of the region.
- An energy manager for an institute of higher education indicated that the County should tie any mandatory building code upgrades with existing LEED requirements.
- A Global Director of Sustainability at a real estate investment/asset advisory firm said the County might want to consider a voluntary incentive for compliance with an advanced, voluntary “stretch” code, such as offering expedited permit review for such projects. This could introduce new standards on a voluntary basis, and if the market proved able to adopt such standards widely, they could become mandatory overtime.
- A Chief Sustainability Officer at a regional real estate development and management firm said that performance-based codes work better, as there are more options for compliance.

- A SVP of Property Management at a large national property management firm said that issuance of an occupancy permit should be tied to successful completion of commissioning of building energy systems, as this can have a major effect on energy performance. It can also condition the market for RCx over time by developing the skills and providers needed.

### ***Mandatory Retrofit Requirements***

- GSA stressed the importance of clearly defining “cost-effective” when determining required retrofit projects. The federal government defines projects with a 10-year or less payback as cost-effective and encourages the County to align with this definition.
- MEA was not supportive of prescriptive retrofit requirements, because the needs of different buildings vary so much that defining specific measures would not be as effective as mandating audits or RCx, which allows measures to be tailored to each building’s needed.
  - MEA is currently studying the motivational differences among and messaging that resonates with different market sectors: nonprofit, commercial, institutional. MEA will develop case studies that present the business case for energy efficiency investment for each sector. The County will be able to use these case studies, though they may not feature stakeholders in Montgomery County specifically.
- A condo association president in a multifamily building did not support this policy, and cautioned that older existing buildings already have a number of prescriptive requirements to comply with (fire safety regulations, ADA, etc.), and would have trouble handling an additional requirement.
- Another multifamily condo association president expressed an opinion that the implementation of a mandatory retrofit policy would be too complicated, especially if there were exceptions or waivers allowed. He also mentioned that many condos need to draw upon (or raise) condo fees to accomplish retrofit projects, and significant changes in fees can result in unsatisfied residents, or (at worst) foreclosures. Out of all of the ten policies, he was least in favor of this one. The survey results support that perception.
- An executive at a housing nonprofit thought that required retrofits would be potentially very burdensome, but suggested that the policy only be triggered when major improvements were already being made to the building.
- A Global Director of Sustainability at a real estate investment/asset advisory firm advised being careful in determining what is “cost effective” – since this may differ between building sectors, between organizations within sectors, and even across buildings of different ages. This tends to support the audit approach rather than the prescriptive retrofit approach.
- A Chief Sustainability Officer at a regional real estate development and management firm said the mandatory approach is not the way forward. Rather, the policy needs to be incentive-based. For example, the County should consider how LEED is becoming the de-facto standard in large cities. People are bringing their buildings up to these standards, absent any mandate for retrofits.

### ***Commercial PACE Financing***

- Several people pointed out that mortgage lenders are not supportive of PACE. The federal agency (FHFA) overseeing residential mortgage markets has sought to ban Fannie Mae and Freddie Mac from buying mortgages on homes with PACE tax liens. While there is no similar ban looming for commercial mortgages, many multifamily buildings are mortgaged via loans that are under FHFA purview, so they might be left out of PACE markets. Moreover, commercial mortgage holders share the same core concern as residential lenders: that a PACE tax lien creates a security interest ahead of those of private lenders, which means that in case of foreclosure, lenders may recover less of the loan principal on PACE-lien buildings.
- A District of Columbia employee expressed a desire for Montgomery County to adopt a commercial PACE program similar to the District's program. This could help develop total investment scale up to \$200-500 million/year, which would capture the interest of secondary markets.
- Local Chamber of Commerce staff expressed concern that the County would be required to "create another tax district," and could be taking on additional debt. She also recommended that policy makers look at the triple A bond rating for the County.
- A condo association president thought that information on PACE financing should be presented directly to building owners and managers so that they are aware that the option is available.
- A multifamily condo association president felt more comfortable with PACE than OBF – he would prefer to repay a loan to the County rather than to the utility, and liked the permanent nature of the County (over utilities, which can change).
- VPs at small, family-owned real estate management firm said that if it is necessary to take out a loan to implement a project, then it is probably too large to get approved in the first place. This may not be the case for larger property owners, but we should expect similar responses from smaller companies.
- The timeframe for PACE funding is likely to be much longer than the investment horizon for commercial real estate owners. Some commenters pointed out that most commercial mortgage loans have 10-year or less balloon payments or similar terms, and that to be economically attractive, PACE loans may need to be longer. While PACE loans can be designed to transfer to future owners, the industry sees this as a complication for sales transactions. One commenter pointed out that the PACE approach is best suited for a long-term owner/occupier, not investor-owned properties. This would rule out a major portion of the commercial market.

### ***On-bill Financing***

- One commenter said that PACE and OBF are the two best financing options that have the potential to get to a wide scale. Because DC is already pursuing commercial PACE, they recommend Montgomery County pursue OBF to model it in a complementary fashion. This could encourage each jurisdiction to later follow the other's model.

- Some commenters observed that OBF has similar virtues to PACE, especially in leased-space buildings, in that as part of the utility bill it can be passed through to tenants in the existing utility billing/cost allocation process.
- One commenter said that OBF is complementary to PACE because it allows a larger number of property owners (typically smaller scale) to participate. PACE may be limited to larger transactions and conservative underwriting terms, that only owners of Class A office buildings would be eligible at first. OBF can apply to smaller property owners and those with less strong credit.
  - Pepco and, to a lesser extent, Washington Gas have been against OBF since DC started discussing the option with them in 2010. However, the commenter thinks that OBF may have a better chance in MD due to the more favorably utility and regulatory climate.
- MEA is very supportive of OBF because:
  - It enables a larger population of businesses including those with higher credit risk (which are often small businesses) the ability to have their creditworthiness evaluated using less traditional underwriting metrics.
  - It is simple and involves relatively few stakeholders (which is not the case for PACE, which MEA is not particularly supportive of).

### ***Energy-Efficient (“Green”) Leasing***

- A major regional developer/owner/manager said that green leasing is mainly a high-end, class A building market, and so far has been in demand mainly by specific large tenants. Moreover, most current green leases only touch lightly on energy issues, focusing on many other green building features and practices. An energy-only leasing arrangement might not thus be of interest to the current green leasing market.
- One commenter pointed out that energy-efficient leasing is just another way to pass the costs of energy improvements through to tenants. If that is the goal, OBF might be a broader and simpler approach that would serve the same purpose.
- A condo association president expressed that green leasing would be difficult to implement in multifamily buildings without individually metered units.
- Some respondents feel that this is a good idea in theory, but that the practical application is much more challenging. The existence of legacy leases makes it difficult to introduce “green leases,” as they would need to be phased in during tenant turnover. Furthermore, if the tenant feels that this lease structure places an obligation upon them that is not present in another lease under consideration, this could be a deal-breaker. The most successful applications of green leases to date have been in buildings that are built from the ground up to be “green,” and to appeal to a certain type of tenant. (Multiple respondents, including Global Director of Sustainability at a real estate investment/asset advisory firm and Chief Sustainability Officer at a regional real estate development and management firm).
- A SVP of Property Management at a large national property management firm said that brokers are not going to support green leases if they think it will kill a deal. Broker education will be essential if this is going to work.

### ***Green Building Tax Credit***

- While a multifamily condo association president strongly supported green building tax credits, he also expressed reservations about using LEED as the basis for the credit, especially for existing buildings. He believes that LEED works well for new buildings, but is not cost-effective for existing buildings. He also said that a green building tax credit should focus solely on energy-related components for existing buildings.
  - An executive at a housing nonprofit recommended that the tax credit be allowed for other types of certification as well as LEED.
- Another condo association president in the multifamily sector supported this policy, but cited the need for publicity and education to raise awareness of the credit's existence.
- Several respondents believe that (and/or have witnessed cases in which) the availability of a tax credit is sufficient to induce a developer/owner to go for LEED Platinum, rather than a lower level of certification. (SVP of Property Management at a large national property management firm; Global Director of Sustainability at a real estate investment/asset advisory firm)

### ***Rebate / Grant Programs***

- Several commenters said they prefer voluntary incentives like rebates and grants to mandatory requirements like benchmarking, RCx, or audits.
- Some respondents pointed out that now that Pepco has a new set of commercial efficiency program incentives, including an RCx program that incorporates benchmarking, why not leverage those resources on a voluntary basis, and see if the market will respond? If the market doesn't respond sufficiently to voluntary approaches, the County could then make requirements mandatory.
- When asked to prioritize the County's investment in the 10 policies/programs mentioned, MEA ranked a combined incentive package of rebates, grants, and tax credits as second only to mandatory RCx/audits. The rationale is that rebates and grants are less subject to gaming than are tax credits, though MEA supports all three.
- One multifamily condo association president strongly supported rebate and grant programs, and said that his building had successfully utilized a County program in the past and had a very positive experience.
- For incentives, it may be worthwhile to consider non-monetary options such as accelerated permitting (i.e., something that offers a benefit to the owner, but does not require the County to find funding). (SVP of Engineering at large national real estate development and management firm; Senior Managing Director at a large national real estate management firm)
- Some respondents expressed opposition to rebates and grants, since they see this as subsidizing those who wouldn't have done it on their own ("Why am I helping to fund my competitor to become more competitive?"). (SVP of Engineering at large national real estate development and management firm)

## *Leadership Challenges*

- Some respondents offered the observation that as a voluntary approach, the challenge model could be a way for the County to test the market for things like benchmarking and RCx. If a large fraction of the market responded, as has 1/3 of the Arlington office space to Arlington County's Green Games initiative, that might be a more viable approach than starting out with a mandatory policy. If after a certain number of years, for example, the market had not reached a threshold level of voluntary benchmarking and performance improvement, the County could then impose mandatory policies.
- An energy manager for an institute of higher education thought that a leadership challenge needs to be structured to allow multiple types of properties to participate. Currently, the County's green business certification program is not designed to allow campuses to participate, but Montgomery College and the University of Maryland – Shady Grove are working with the County to revise the program to include them. It was suggested by others as well that the green business certification model could become part of a new energy leadership challenge initiative.
- A multifamily condo association president supported this policy, but recommended that the County not require too many forms, procedures, or verification protocols, etc. for the proposed leadership program. He also mentioned that a technical assistance component would be a helpful addition to this policy.
  - Another multifamily condo association president said that they would not be interested in this policy, because they were not looking for recognition or publicity for their efforts.
- A project manager at a property management firm thought that a Leadership Challenge would not be worth the time and effort it would take to participate.
- Some respondents from companies with a history of achievement in programs like ENERGY STAR were not in favor of this approach, in that it would favor "laggards" who had not improved their buildings, but could now show big improvements, while the long-time committed companies would have a harder time showing the same progress in buildings that were already at ENERGY STAR performance levels.
- A Global Director of Sustainability at a real estate investment/asset advisory firm said that the churn rate (short ownership spans) for investor-owned properties makes it difficult for these owners to commit to a long-term challenge.

## 5.0 Conclusions and Recommendations

Focusing the findings on the County's goal to identify the best policy and program solutions for achieving the 2009 Climate Protection Plan's 25% energy use reduction over ten years, ICF draws the following conclusions:

- **Reaching the energy savings goal will be difficult-** ICF's analysis shows that the technical potential exists to achieve the 25% goal in 10 years. However, this technical potential assumes a perfect world in which neither economics nor market barriers constrain investment; it assumes every energy-using device is instantly replaced with the most-efficient model available. Therefore, reaching the County's goal would require technical approaches that are not in general practice, as well as a very aggressive set of policies and programs.
- **Policies and program solutions can make substantial progress toward the goal-** While no one policy or program reviewed in this Study can meet the savings goal by itself, several showed the potential to attain significant energy savings. This is consistent with energy efficiency policy studies performed around the country, in which there is no one "silver bullet" solution, but a suite of "silver BBs" or "silver buckshot" policies.
- **Stakeholders favor voluntary approaches on balance-** While some mandatory policies, such as building energy codes, received favorable stakeholder ratings, the balance of stakeholder input supports voluntary over mandatory approaches. The County should seek to carefully balance these policy and program approaches in considering its options going forward.
- **EmPOWER Maryland programs offer significant leverage-** Utility ratepayer-funded programs available to the County's commercial and multifamily building owners align well with several of the policy and program options evaluated in this Study, including retro-commissioning, benchmarking, and financial incentives. Given the County's limited funding options in the post-ARRA environment and the current fiscal climate, utility-administered programs represent the largest single source of support for the County's efforts going forward.

These conclusions lead ICF to the following recommendations for the County:

- **Develop a suite of policies based on a "voluntary with backstop" approach-** Because utility programs currently offer retro-commissioning and benchmarking services as well as rebates for efficient technologies, the County could leverage these programs through a community-challenge approach. The County could challenge larger building owners to commit to voluntary energy savings targets, including benchmarking their buildings, and set quantitative targets for participation and energy savings for a defined time period. If enough of the market participated voluntarily and reached these targets, the County could waive mandatory benchmarking and retro-commissioning regulations. If the targets were not met by the end of the defined time period, regulations would take effect on a pre-established date.

Within this overall recommendation, the following corollary recommendations apply:

- **Focus on larger buildings-** 50,000 square foot buildings or larger represent 75% of commercial floor space in the County. The County can reach 75% of the market while impacting only one in six buildings.
- **Focus carefully on multifamily buildings-** Although this is a difficult to reach segment because of the wide diversity of build types and ownership patterns, these buildings hold a great deal of the total energy savings potential. Multifamily markets require special emphasis, including tailoring program technologies, incentives, and outreach efforts to meet the specific needs of multifamily owners, managers, and tenants.
- **Focus on the most cost-effective avenues-** Policies and programs should be designed to target the most cost-effective opportunities in the commercial and multifamily markets, including time of construction, time of equipment replacement, time of refinancing or resale, or major renovation.
- **Leverage existing resources-** The current EmPOWER Maryland utility programs are the principal source of incentives and technical resources for helping commercial and multifamily buildings achieve the County's energy savings goals. The County Green Business Certification program is a framework in which the County should launch the community challenge approach. Energy services providers can also be sources of expertise and other capacity the County can leverage to help launch and sustain its policy and program initiatives.
- **Provide implementation support from County Staff** This initiative will require momentum driven from the County and adequate staffing. While leveraging outside resources is important, experience in Washington, D.C. and other local governments makes it clear that some basic staffing is needed to ensure that new initiatives move forward and succeed. Even if only one significant policy is implemented, at least one full-time staff position would likely be needed to make the effort succeed; multiple policies and programs would likely increase total staffing and related resource needs.

## 6.0 Appendices

## 6.1 Appendix A: Energy Modeling

This appendix documents ICF's energy modeling results and methodology to:

- Establish the county level energy consumption baseline;
- Establish the technical energy savings potential of the County's commercial and multi-family residential baseline; and
- Project the increase in county level energy consumption due to new construction.

The County's tax database and CoStar data were used to derive the number and size of the buildings in the County. These figures were used to determine the county level baseline energy consumption using Energy Utilization Indices (EUI) gathered from various Maryland PSC documents and Energy Information Administration (EAI) data.

ICF used its Energy Efficiency Potential Model (EEPM) to model the individual energy efficiency measures and to explore their combined county level energy savings impact. Individual energy efficiency measures were selected after a review of Demand Side Management (DSM) deemed saving manuals, DSM Measurement and Verification (M&V) reports, public utility commission filings, ICF's previous DSM experience, manufacturer literature, reputable case studies and academic papers. Financial costs and benefits of the measures were also modeled within EEPM and various cost-benefit analyses were applied as indicative costs of achieving the technical energy savings potential.

### **Energy Efficiency Potential Model (EEPM)**

EEPM is a sophisticated yet intuitive and understandable Microsoft Excel based tool that projects the technical, economic, achievable, and program potential of a wide range of electric and natural gas efficiency measures under alternate incentive and program design scenarios. Using service territory specific data regarding avoided costs, market size, rates, and other information ICF uses EEPM to assess the potential for adoption of the efficiency measures, develops a detailed representation of energy and capacity savings, and calculates the cost-effectiveness of individual measures, programs, and portfolios of programs.

EEPM has been used for regulatory filings and IRP analysis throughout the country, including the territories served by the Potomac Electric Power Company (PEPCO), Baltimore Gas and Electric (BG&E), Southern Maryland Electric Cooperative (SMECO), Florida Power & Light, Commonwealth Edison, South Carolina Electric and Gas (SCE&G), Entergy Corporation and many others.

The inputs to EEPM include system inputs such as discount rates, inflation and escalation rates, utility avoided energy and capacity costs, utility retail rates, and other utility planning assumptions. Measure inputs as well as program inputs include program start and end dates, program start-up and annual costs, and net-to-gross ratios (NTGR), as applicable. The measure-based inputs include names and descriptions, energy and capacity usage and savings, lifetime, and full, incremental, and incentive costs as applicable.

Based upon the measure data inputs developed above, ICF used EEPM to screen each measure for applicability across customer classes, facility types, and end uses to produce estimates of technical potential. Cost-effectiveness was determined by calculating the ratio of present-valued benefits to present-valued costs. In the case of retrofit measures, the incremental measure cost is actually equal to the full installed measure cost. In addition, economic potential would not include program costs, such as incentives, and administrative and marketing costs. However these costs were excluded in the modeling for this study.

### Baseline Energy Consumption

County tax database and Costar data were used to determine the number of buildings and gross floor area of commercial and multifamily buildings in the County. The gross floor area was then multiplied by the EUI data gathered from Itron's Maryland Commercial Building baseline study for commercial buildings. For multifamily buildings, a review of RECS database, 2010 US-census results for the County and EAI data on state level residential energy consumption were used. Table A-1 represents the County level commercial and multifamily building share-down and energy consumption baseline. Schools were excluded from the study.

**Table A-1: County Level Subsectoral Building Sharedown and Energy Consumption**

Building Type	Number of Properties	Area ft2	Electricity kWh/ft2	Nat Gas Therms/ft2	EUI MMBtu/ft2	Energy MMBtu
Office	1,098	63,061,439	15.48	0.24	0.076	4,816,690
Retail	1,487	30,382,958	10.72	0.17	0.054	1,629,206
Warehouse	563	16,820,482	13.50	0.59	0.105	1,765,534
Lodging	37	3,110,514	17.19	0.52	0.111	343,906
Health	121	2,590,881	16.51	1.39	0.196	506,897
Hospital	6	1,997,836	31.03	1.29	0.235	469,864
Restaurant	232	1,384,969	39.76	1.19	0.255	352,764
Grocery	72	1,283,412	55.59	0.58	0.248	317,965
Miscellaneous	672	32,274,218	12.28	0.50	0.092	2,965,723
<b>Commercial Subtotal</b>	<b>4,288</b>	<b>152,906,709</b>	<b>14.46</b>	<b>0.37</b>	<b>0.086</b>	<b>13,168,550</b>
Multifamily	1,002	98,095,161	8.61	0.10	0.039	3,846,705
<b>County Level Total</b>	<b>5,290</b>	<b>251,001,870</b>	<b>12.17</b>	<b>0.26</b>	<b>0.068</b>	<b>17,015,256</b>

### Technical Energy Savings Potential

#### *Selection of Energy Efficiency Measures*

Energy efficiency measures were selected based on proven technologies that were tabulated after a review of DSM deemed savings manuals. These manuals included:

- Mid-Atlantic Technical Reference Manual (TRM) Version 2.0 - Vermont Energy Investment Corporation (VEIC) and Northeast Energy Efficiency Partnerships; and

- New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs (commonly referred as NYS Tech Manual) – New York Department of Public Service.

In addition, ICF explored measures that were not included in these manuals based on past project experience and market research. These measures included solar thermal hot water, photovoltaic panels, custom upgrades, savings through behavioral change, and envelope upgrades.

### **Determination of MMBTU savings per measure**

Capturing the MMBTU saved per technology is analytically simple, yet a challenging process due to data availability. MMBTU savings per technology within a building type is simply the difference of the energy consumption of the baseline technology and the energy consumption of the upgrade technology. This difference is then multiplied by the number of units available within the County to come up with the county level savings potential of the particular technology.

It is essential to capture the efficiency level of the existing equipment in the County per building type. This was addressed by the commercial and residential baseline studies carried out by Itron and KEMA respectively for Maryland PSC. These baseline studies provided the current state of the building stock in terms of energy efficiency levels and the applicability of various technologies. For example, the commercial baseline study provides an average efficiency level for unitary AC equipment and how much of the building stock is served by a certain size range of such equipment. ICF then researched the currently available equipment and technologies that can upgrade these existing unitary AC equipment based on manufacturer databases. It should be noted that some buildings' equipment might be better or worse than the average state of the state and per building level savings will vary from building to building.

Savings per each selected measure were entered into EEPM based on the applicability of the technology on building types. The savings algorithms were obtained mainly from the DSM technical manuals. In the case of weather-sensitive technologies, only the algorithms from the Mid-Atlantic TRM were used. When a particular technology was not available in the manuals, ICF used engineering calculations based on product literature and reputable case studies. For envelope upgrades, ICF's Beacon Commercial ®<sup>146</sup> software tool was used to estimate savings.

ICF also utilized the Maryland PSC baseline studies to estimate the fuel split of primary heating fuels and equipment sales data in the technical potential estimate.

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<sup>146</sup> **Beacon Commercial:** This EnergyPlus powered tool can model a wide range of commercial building types and scenarios to determine the impact of occupant behavior, building characteristics, or external influences such as weather conditions and utility costs. It incorporates a compliance option feature to model buildings that meet the requirements of the ASHRAE 90.1 and the IECC.

## Technical Energy Savings Potential

**Error! Reference source not found.** and **Error! Reference source not found.** represent the technical energy savings potential of the commercial and multifamily building stock over the established energy consumption baseline. The technical potential assumes that all of the building owners upgrade their existing equipment and building envelope to the most energy efficient level that is commercially available. The energy savings potential is 30.7% of the baseline energy consumption of the combined commercial and multifamily building stock excluding the energy consumption increase by new building construction. These upgrades would cost the building owners \$8.8 Billion. This cost estimate assumes the full cost of the upgrades.

**Table A-2: Technical Energy Savings Potential of the Commercial Building Stock**

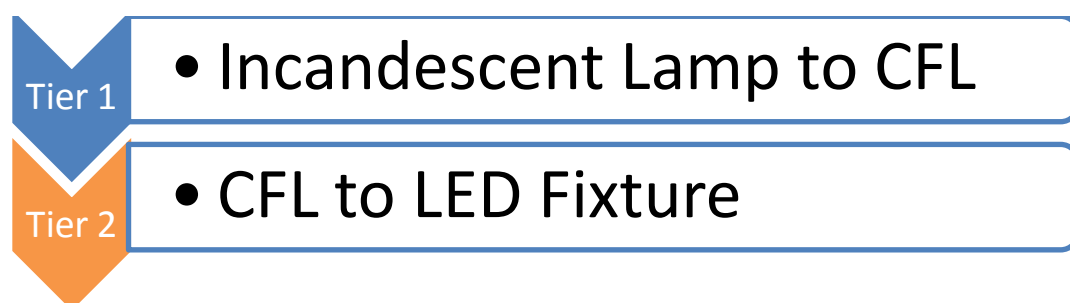
<b>Program Name</b>	<b>Program Tier</b>	<b>MMBTU Savings</b>	<b>% of Baseline Consumption</b>	<b>Retrofit Cost \$Mil</b>	<b>\$/MMBTU</b>
Increased Lighting Efficiency	Tier 1	855,357	5.03%	\$72.1	\$84
LED Lighting (additional to above)	Tier 2	93,059	0.55%	\$189.7	\$2,038
Increased HVAC Efficiency	Tier 1	357,687	2.10%	\$277.9	\$777
HVAC Highest Level Efficiency Improvements (additional to above)	Tier 2	81,302	0.48%	\$269.8	\$3,319
Pumps & Fans	Tier 1	266,085	1.56%	\$102.8	\$386
Boiler & Furnace Upgrades	Tier 1	64,186	0.38%	\$22.4	\$349
DHW Efficiency	Tier 1	352,207	2.07%	\$38.7	\$110
Plug loads	Tier 2	6,208	0.04%	\$19.5	\$3,148
Full Retro-Commissioning	Tier 1	306,063	1.80%	\$14.5	\$47
Behavioral	Tier 1	34,688	0.20%	\$1.2	\$35
Envelope Upgrades	Tier 2	106,348	0.63%	\$3,059.6	\$28,770
Aggressive Envelope Upgrades	Tier 2	75,721	0.45%	\$3,290.0	\$43,449
Solar Hot Water Installation	Tier 2	73,459	0.43%	\$29.9	\$407
PV	Tier 2	233,418	1.37%	\$103.4	\$443
Electric Heating to ASHP	Tier 2	277	0.00%	\$0.94	\$3,388
Custom/Other	Tier 2	3,276	0.02%	\$2.5	\$778
<b>Total Commercial Portfolio</b>		<b>2,909,341</b>	<b>17.1%</b>	<b>\$7,495</b>	<b>\$2,576</b>

**Table A-2: Technical Energy Savings Potential of the Multifamily Building Stock**

<b>Program Name</b>	<b>Program Tier</b>	<b>MMBTU Savings</b>	<b>% of Baseline Consumption</b>	<b>Retrofit Cost \$Mil</b>	<b>\$/MMBTU</b>
Increased Lighting Efficiency	Tier 1	84,427	0.50%	\$1.8	\$22
LED Lighting (additional to above)	Tier 2	10,356	0.06%	\$17.1	\$1,648
EnergyStar Appliances	Tier 1	167,230	0.98%	\$86.0	\$514
2nd Tier Appliances (additional to above)	Tier 2	53,077	0.31%	\$253.1	\$4,769
EnergyStar Cooling	Tier 1	108,929	0.64%	\$112.4	\$1,032
2nd Tier Cooling (additional to above)	Tier 2	124,085	0.73%	\$322.2	\$2,596
Condensing Furnaces	Tier 1	119,906	0.70%	\$41.1	\$343
Central Boiler & DHW	Tier 1	83,600	0.49%	\$1.1	\$13
1st Tier DHW	Tier 1	129,351	0.76%	\$41.0	\$317
2nd Tier DHW (additional to above)	Tier 2	82,289	0.48%	\$38.1	\$463
Programmable Thermostat	Tier 2	11,854	0.07%	\$4.1	\$347
EnergyStar Windows	Tier 1	200,714	1.18%	\$54.4	\$271
Electric Heating to ASHP	Tier 1	365,243	9.49%	\$135.1	\$371
PV	Tier 2	97,892	0.58%	\$45.2	\$462
Smart Strips	Tier 1	20,570	0.12%	\$1.7	\$83
Miscellaneous Upgrades	Tier 2	120	0.00%	\$0.0	\$370
Direct Metering	Tier 2	48,606	0.29%	\$24.0	\$494
Residential Benchmarking	Tier 1	68,278	0.40%	\$2.5	\$778
<b>Total Multifamily Portfolio</b>		<b>1,776,527</b>	<b>10.44%</b>	<b>\$1,180</b>	<b>\$664</b>

Even though some technologies are proven to be energy efficient, they are not widely implemented due to upfront costs and the ease/practicality of implementation. Some of these technologies have some alternatives which are less energy efficient, yet more affordable. These more affordable options tend to save more energy per capital expenditure spent and therefore are usually incentivized by the utilities. For example, LED lighting can save up to 90% of energy compared to incandescent lamps. CFL technology can save around 70% compared to incandescent technology; yet CFL costs ten times less than LED lighting. To portray this situation, an incremental tiered savings approach was adopted in the modeling. Tier 1 measures are the cost effective practical technologies. Tier 2 involves technologies that are energy efficient, but not cost effective at the current utility retail rates. In the modeling, the savings of the Tier 2 technologies are the incremental savings gained by moving from the Tier 1 technology to a Tier 2 technology. In some cases such as photovoltaic installations, there is no Tier 1 technology due to the nature of technology. In such cases, a technology is classified as Tier 2 if the financial payback is longer than a year.

**Figure A-4: Tiered Approach to Energy Modeling for Less Cost-Effective Measures**



The interactive effects of different measures have not been included in the analysis for analytical simplicity. For example savings from a HVAC upgrade is simply added to the savings achieved by a lighting measure in the calculation of the technical energy savings potential estimate. In reality, the lighting upgrade would reduce the savings estimated for the HVAC upgrade.

### **Achieving Technical Energy Savings Potential in Ten Years**

To achieve the full technical energy savings potential, all functioning equipment should be replaced with new equipment of highest level of energy efficiency in the market. However early retirement of functioning equipment is a costly process and is often deemed as an unexpected cash outflow by building owners. DSM experience shows that equipment is usually replaced on the failure of the equipment or at the end of its expected useful life. In this scenario, which is widely referred as a “Replace on Burn-out” (ROB) or “Replace on Failure”, the building owner must replace the failed-equipment. Therefore the cash out-flow to purchase a necessary standard equipment is an acceptable cost to the owner. Purchasing equipment above the required efficiency level, however, is still considered as an additional financial cost even though it is a less significant cost than the full cost of the energy efficient equipment. To maximize the total impact of their DSM programs per a dollar of incentive spent, utility sponsored energy efficiency programs aim at influencing the building owners that are going through a routine replacement cycle or equipment failure providing incentives for the high energy efficient equipment based on the incremental cost over standard equipment. Table A-5 and Table A-6 represent the costs

normalized by the annual energy savings (\$/MMBTU) of full retrofit and ROB situations for the commercial and multi-family existing building stock.

**Table A-5: Cost of Upgrades Needed To Save 1 MMBTU per Year in the Commercial Building Stock**

<b>Program Name</b>	<b>Program Tier</b>	<b>Retrofit Cost \$Mil</b>	<b>\$/MMBTU</b>	<b>ROB Cost \$Mil</b>	<b>\$/MMBTU</b>
Increased Lighting Efficiency	Tier 1	\$72.1	\$86	\$42.2	\$84
LED Lighting	Tier 2	\$189.7	\$2,038	\$163.4	\$1,907
Increased HVAC Efficiency	Tier 1	\$277.9	\$777	\$20.5	\$118
HVAC High Level Efficiency Improvements	Tier 2	\$269.8	\$3,319	\$42.3	\$780
Pumps & Fans	Tier 1	\$102.8	\$386	\$8.8	\$121
Boiler & Furnace Upgrades	Tier 1	\$22.4	\$349	\$5.8	\$177
DHW Efficiency	Tier 1	\$38.7	\$110	\$2.7	\$9
Plug loads	Tier 2	\$19.5	\$3,148	\$10.4	\$4,194
Full Retro-Commissioning	Tier 1	\$14.5	\$47	N/A <sup>147</sup>	N/A
Behavioral	Tier 1	\$1.2	\$35	N/A*	N/A
Envelope Upgrades	Tier 2	\$3,059.6	\$28,770	N/A	N/A
Aggressive Envelope Upgrades	Tier 2	\$3,290.0	\$43,449	N/A	N/A
Solar Hot Water Installation	Tier 2	\$29.9	\$407	N/A	N/A
PV	Tier 2	\$103.4	\$443	N/A	N/A
Electric Heating to ASHP	Tier 2	\$0.94	\$3,388	\$0.5	\$2,949
Custom/Other	Tier 2	\$2.5	\$778	N/A	N/A
<b>Total Portfolio</b>		<b>\$7,495</b>	<b>\$2,576</b>	<b>\$297</b>	<b>\$243</b>

\*Measures with N/A in this column are not considered ROB candidates in typical applications

<sup>147</sup> Measures that involve behavioral change or the installation of a technology not currently installed in the existing building stock are not eligible for ROB scenario analysis. These measures are marked as N/A.

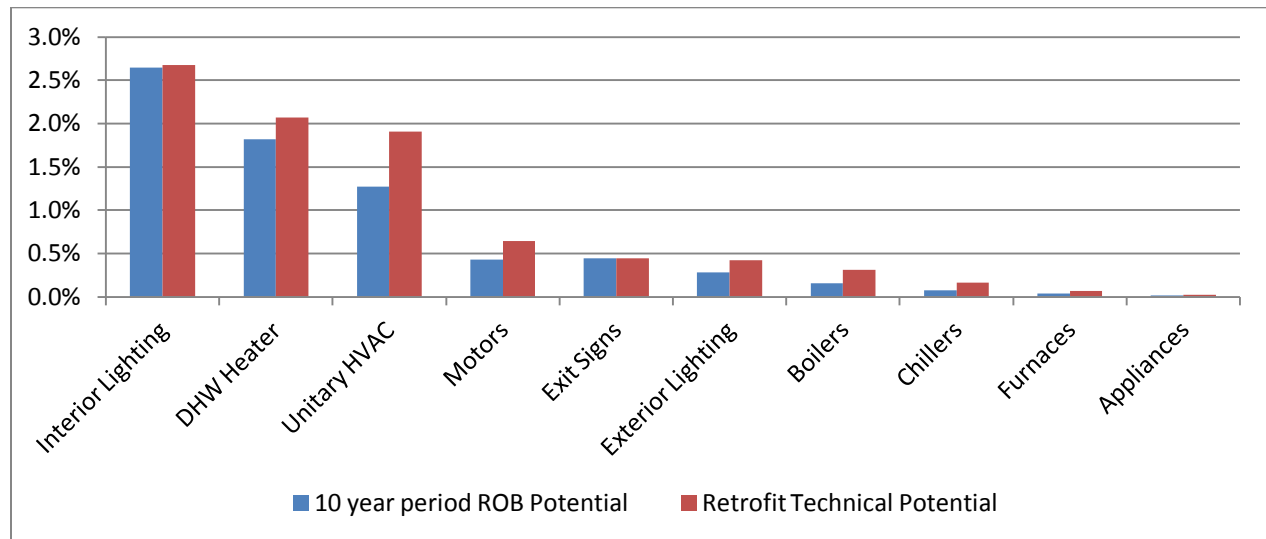
**Table A-6: Cost of Upgrades Needed To Save 1 MMBTU per Year in the Multifamily Building Stock**

<b>Program Name</b>	<b>Program Tier</b>	<b>Retrofit Cost \$Mil</b>	<b>\$/MMBT U</b>	<b>ROB Cost \$Mil</b>	<b>\$/MMBT U</b>
Increased Lighting Efficiency	Tier 1	\$1.8	\$22	\$1.4	\$17
LED Lighting	Tier 2	\$17.1	\$1,648	\$10.9	\$1,572
Energy Star Appliances	Tier 1	\$86.0	\$514	\$5.2	\$51
2nd Tier Appliances	Tier 2	\$253.1	\$4,769	\$37.4	\$1,031
Energy Star Cooling	Tier 1	\$112.4	\$1,032	\$8.2	\$124
2nd Tier Cooling	Tier 2	\$322.2	\$2,596	\$97.6	\$1,391
Condensing Furnaces	Tier 1	\$41.1	\$343	\$19.8	\$297
Central Boiler & DHW	Tier 1	\$1.1	\$13	\$0.3	\$7
1st Tier DHW	Tier 1	\$41.0	\$317	\$7.7	\$64
2nd Tier DHW	Tier 2	\$38.1	\$463	\$17.6	\$268
Programmable Thermostat	Tier 2	\$4.1	\$347	N/A	N/A
EnergyStar Windows	Tier 1	\$54.4	\$271	\$11.7	\$145
Electric Heating to ASHP	Tier 1	\$135.5	\$330	\$67.0	\$330
PV	Tier 2	\$45.2	\$462	N/A	N/A
Smart Strips	Tier 1	\$1.7	\$83	N/A	N/A
Other	Tier 2	\$0.0	\$370	\$0.0	\$370
Direct/Sub- Metering	Tier 2	\$24.0	\$494	N/A	N/A
Residential Benchmarking	Tier 1	\$2.5	\$778	N/A	N/A
<b>Total Portfolio</b>		<b>\$1,180</b>	<b>\$664</b>	<b>\$284</b>	<b>\$302</b>

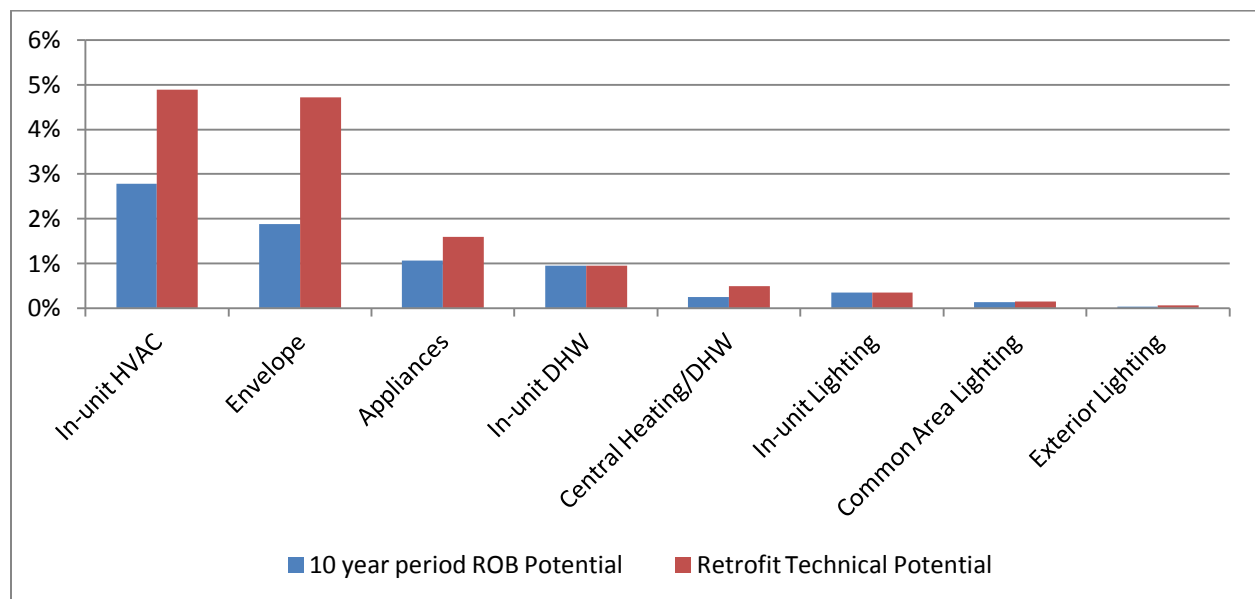
Results indicate that addition of energy efficiency technologies and early replacement of functioning equipment is ten times less cost effective compared to a ROB scenario. However, replacing equipment on failure or routine replacement periods limit the achievable savings potential in a 10 year time-frame since most equipment have longer useful life expectancy than this time-period. Figure A-7 and Figure A-8 represent the total energy savings potential that can

be achieved through upgrading equipment on ROB situations over 10 years compared to the full technical potential of various measures eligible for the ROB scenario.

**Figure A-7: MMBTU Savings Potential within 10 Years over the County Level Energy Consumption Baseline with ROB Approach vs. Full Technical Potential in the Commercial Building Stock**



**Figure A-8: MMBTU Savings Potential within 10 Years over the County Level Energy Consumption Baseline with ROB Approach vs. Full Technical Potential in the Multi-family Building Stock**



Even though energy efficiency upgrades are most cost effective on ROB cases, the maximum energy savings that can be achieved from ROB cases is limited to 16.6% of the County level

energy consumption baseline of commercial and multi-family buildings combined. This figure is roughly the half of the full technical potential estimate.

## **Costs**

The cost estimate for the buildings were based on DSM deemed savings manuals, M&V reports, EIA data, catalog price research and reputable case studies by DOE and national laboratories. Both the baseline technology and the upgrade have been assigned a cost per each measure to calculate cost differentials in ROB cases.

Various cost benefit analysis and Participant Cost Test relies on EAI energy price data and projections. The cost benefit analysis was done by a net present value analysis of projected utility cost savings over the expected useful life of the upgraded equipment. In cases where the measure increased the use of a secondary fuel type, the net present value of these additional utility costs were also considered in the modeling.

## **Effects of New Building Construction**

The County level energy consumption will increase as new buildings are built in the county. The increase in the energy consumption will be driven by two factors:

1. The growth of the building stock over the projection horizon; and
2. The energy efficiency code requirements on new construction projects.

Since the growth of the building stock is dependent on many socio-economic factors, a sensitivity analysis was carried out at three different growth scenarios over the 10 year projection period:

1. Low growth scenario at 1% annual cumulative growth rate
2. Historical growth rate of the County in the last 20 years at 1.7% annual cumulative growth rate
3. High growth scenario at 5% annual cumulative growth rate.

Assuming that the likely new construction code requirements will be the equivalent of ASHRAE 90-1 2010 or IECC 2012, a new building would be 60% more energy efficient on average compared to the existing buildings in the county based on the Maryland PSC Commission baseline studies and the published EUI estimates for ASHRAE 90.1 2010 compliant buildings<sup>148</sup>. Under these code requirements, the increase in the energy commercial and multifamily consumption of the County would be 8% to 44% over 10 years with a 1% to 5% annual growth assumption. Such growth can easily offset the energy savings achieved from the existing building stock through energy upgrades.

Adopting a more stringent energy code would be helpful to limit the increase in energy consumption of the new buildings. Therefore the sensitivity analysis on building growth rate was expanded with various stringency levels of hypothetical energy efficiency requirements (Figure A-9):

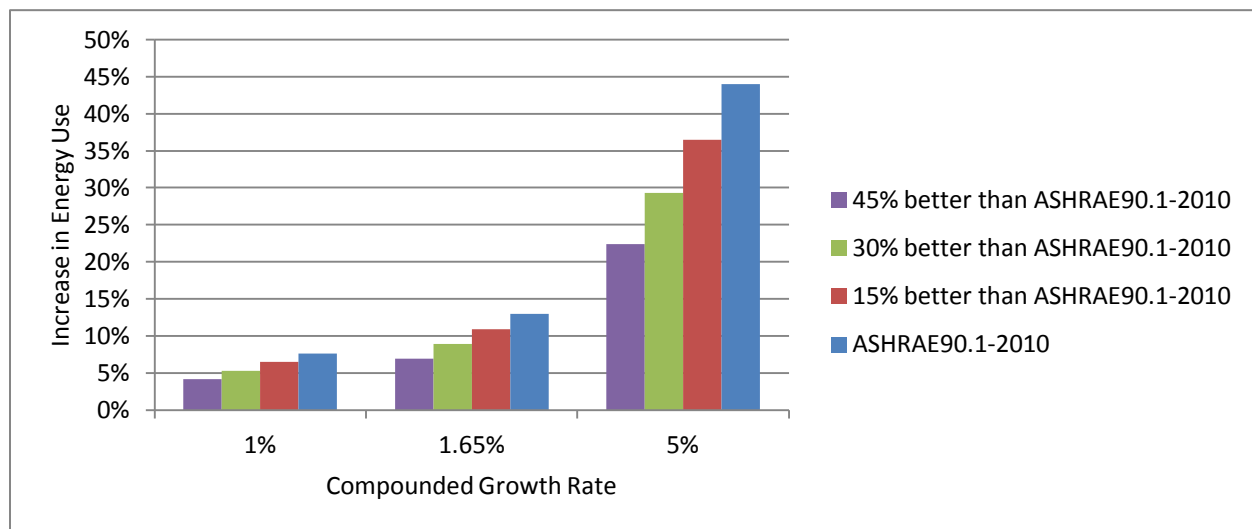
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<sup>148</sup> Federal Register / Vol. 76, No. 139 / Wednesday, July 20, 2011 / Notices

1. ASHRAE 90.1 – 2010
2. 15% More Stringent than ASHRAE 90.1 – 2010
3. 30% More Stringent than ASHRAE 90.1 – 2010
4. 45% More Stringent than ASHRAE 90.1 – 2010

Under the historical building growth trend of annual 1.65% growth and a building code equivalent of ASHRAE 90.1-2010, the new buildings would contribute an additional 13% to the energy consumption of the county over the next 10 years.

**Figure A-9: Increase in County Level Energy Consumption Due to New Construction Under 3 Building Growth Assumption and 4 Code Scenarios**



## Further Discussion

### Source vs. Site Energy

Providing energy in a usable form to building sites requires an additional amount of energy for various fuels. For every BTU of natural gas delivered to the site, an additional 0.1 BTU of energy is foregone. For every BTU of electricity delivered to a building site, an additional 2.16 BTU of energy is consumed. Utility costs and the greenhouse gas emissions are usually proportional to the ratio of source to site energy.

During the review of the energy efficiency measures, ICF only focused on measures that would provide site energy reduction in line with the County's target of 25% site energy reduction over 10 years. Some popular energy efficiency measures such as cool roofs were not included in the modeling since they might end up increasing the site energy consumption. On the other hand, some less popular measures such as switching gas heating to air-source heat pumps (ASHP) were included in the model. These measures provide site energy reduction despite no reduction in utility costs, source energy reduction or greenhouse gas reduction.

Switching from fossil fuel space and domestic hot water heating to air-source heat pumps (ASHP) would provide a site energy reduction of 3.2% over the commercial and multifamily building site energy consumption baseline. However, the switch from fossil fuels to ASHP

would only save an insignificant 0.3% over the source energy consumption of the County's commercial and multifamily building stock.

Cool roofs are a popular energy savings measure in climates with high air conditioning loads. By covering the roof surface with a reflective material, the solar heat load on the air conditioned space is reduced and in turn saves electricity during the summer. However, the cool roof keeps reflecting the solar heat load during the heating months as well, and increases the need for heating. When examined from a site energy perspective, in some building types the net energy consumption is elevated in the presence of cool roofs as the increased energy consumption for heating end-use offsets the mechanical cooling benefits during the summer months. The net benefits from a financial cost or source energy perspective however are positive for cool roof systems in the Montgomery County climate zone.

Combined Heat and Power (CHP) technology was not included in the energy efficiency measure portfolio as it increases the site energy consumption despite the decrease in source energy usage. CHP systems generate electricity and utilize the waste heat for space and domestic hot water heating needs of buildings. They can be optimized to provide different ratios of electricity and heat per BTU of fuel. After a literature review, it was determined that an average commercial grade CHP system would convert 25% of the input energy into electricity and provide usable heat at a rate of 40% for space or hot water heating. Overall, only some 65% of the site energy would be utilized on a net MMBTU energy basis. A modern condensing gas boiler, on the other hand, can provide efficiencies up to 95% and is more energy efficient when compared to a CHP system by site energy consumption. If source energy were the basis comparison, then this CHP system would be 6% more energy efficient compared to a commercial grade condensing boiler.

### **Oil to Natural Gas Switching**

Some buildings in the county use a primary heating fossil fuel other than natural gas. These buildings might be located in areas not served by the natural gas grid. Also, these buildings might just be built during an era where steam oil boilers were the choice of primary heating. In either case, ICF modeling assumes no substitution between fossil fuels to simplify the modeling assumptions.

In the modeling, the number of buildings served by fuel oil and LPG were determined using the Maryland PSC baseline studies. LPG systems were modeled using natural gas systems due to the similarities in the fuels.

## 6.2 Appendix B: Stakeholder Survey

This Appendix provides additional survey results information.

The Green Building Tax Credit (Policy #8) had the most favorable ratings of all the policies presented, with a mean rating of 4.02 out of 5. The majority felt at least somewhat positively about it (75% of Owners/Managers and 85% of Other Stakeholders) and less than 10% of either group felt negatively about it.

- The components of this policy—increasing credit percentages, modifying eligibility levels, and adding specific energy performance requirements—were all seen as at least somewhat positive by more than half of those surveyed. Adding specific energy performance requirements had the highest percentages of negative responses, but even those were only 14 to 15%.
- When asked about Montgomery County’s current Green Building Tax Credit, 33% of Owners/Managers and 62% of Other Stakeholders said they had not been aware it existed.

Commercial Property-Assessed Clean Energy (PACE) Financing (Policy #5) was the second-highest rated policy overall, with 66% of survey respondents feeling somewhat or very positive about it (more specifically, 60% of Owners/Managers and 74% of Other Stakeholders). PACE also garnered the highest percentage of “very positive” ratings from Owners/Managers (37%).

- More than half (57% of Owners/Managers and 55% of Other Stakeholders) said they probably or definitely would participate in a PACE program if they were to need financing for energy efficiency projects (assuming the financing terms were competitive).
- Of the features mentioned, the ability to extend financing of capital-intensive improvements over a longer time horizon (e.g., 10 to 20 years) with PACE had the most appeal to both groups.
- One-quarter (25%) of Owners/Managers thought PACE was “much better” than a conventional loan, and another 44% thought it was at least “somewhat better,” amounting to 69% of Owners/Managers who felt that PACE had an edge over conventional loans. Additionally, 81% of Other Stakeholders thought that PACE was at least somewhat better than a conventional loan.

Policy #10, Leadership Challenge/Strategic Energy Management, was also near the top of the ratings with an overall mean of 3.69 out of 5. It had the second-highest percentage of positive responses from Owners/Managers (69%) of any policy.

- Among Other Stakeholders, this policy had the highest percentage of neutral responses (30%), suggesting that this group may have felt that this policy was less applicable to them and more geared toward building owners or managers.

Rebate and Grant Programs (Policy #9) rounded out the top four policies presented, with 65% of Owners/Managers and 67% of Other Stakeholders feeling positive about it.

- When asked about possible alternatives within Policy #9, 76% of Owners/Managers and 88% of Other Stakeholders said they would feel at least somewhat more positive about the policy if it made more kinds of efficiency measures available, while 67% of Owners/Managers and 64% of Other Stakeholders indicated that they would like to see increased rebate amounts for currently eligible efficiency measures.
- In terms of how to pay for energy incentives, no potential funding source had strong appeal. Redirecting existing energy tax revenues from other County budget priorities was rated slightly more favorably than other possible sources. Increasing the County's energy tax rate had the lowest ratings (at least 50% of each group felt negatively about this funding source).

Prescriptive Building Retrofit Requirements (Policy #4) and Commercial Building Energy Assessments/Retro-Commissioning (Policy #2) were the lowest-rated policies presented.

- Among Owners/Managers, 50% felt somewhat/very negative about Policy #4 and 44% felt negatively about Policy #2 (both policies were viewed negatively by 33% of Other Stakeholders).
- For Policy #2, 55% of Owners/Managers and 56% of Other Stakeholders said they would feel at least somewhat more positive if it exempted buildings that could demonstrate they have achieved the ENERGY STAR building label and are maintaining it in subsequent years. Additionally, 53% of Owners/Managers and 48% of Other Stakeholders would feel more positively if it exempted buildings when owners/managers can demonstrate that similar studies to those outlined in Policy #2 had been conducted within the last five years and that performance improvements of at least 10% have been documented through benchmarking data.
- Half of Owners/Managers indicated that they would feel at least somewhat more positive about Policy #4 if it exempted organizations that benchmark their energy performance and achieve a minimum score (48% of Other Stakeholders agreed).

Owners/Managers were asked for their perspective on barriers they may face in their efforts to make their buildings more energy efficient. Lack of capital to pay for efficiency improvements was the most frequently selected by far in terms of posing a "major barrier" (64%). In all, 85% said this was at least a minor barrier (only 15% said that this was not a barrier for them).

- More than half (58%) of Owners/Managers indicated that different interests between those who pay energy bills and those who make energy efficiency investment decisions was at least a minor barrier for them (including 32% who said this was a major barrier).
- More than half (59%) also said that not knowing how their energy usage compares with that of similar buildings was at least a minor barrier to their energy efficiency efforts.

Apart from 6% of Owners/Managers who said they had not made any energy efficiency improvements, all but one respondent indicated that they paid for improvements through internal funds.

- Additionally, 12% said they used conventional loans with established lenders, 10% performance contracting with energy services companies, and 6% short-term vendor financing.

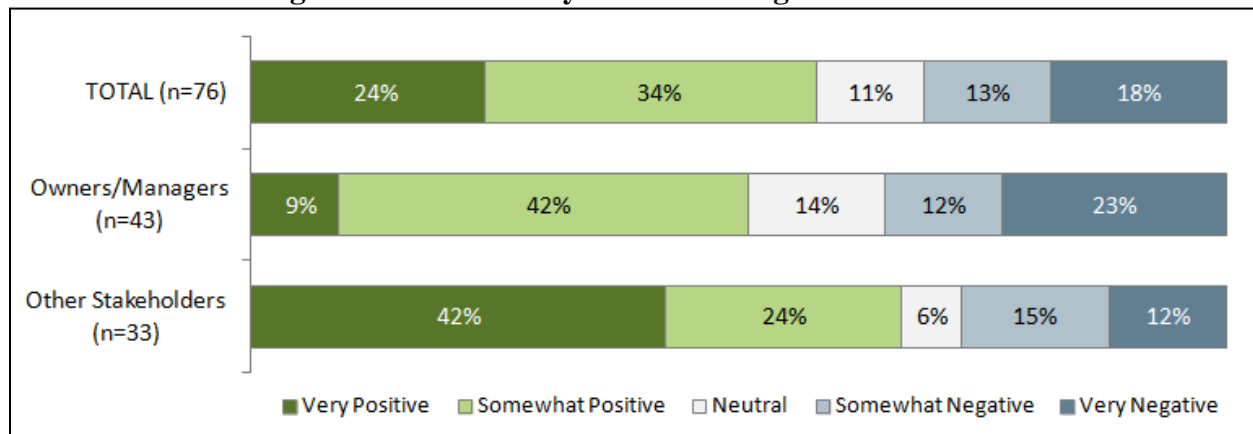
While 29% of Owners/Managers said they have not participated in any of the utility programs listed here, 59% said they have participated in prescriptive rebate programs from utilities, 29% in custom rebates, 22% in retro-commissioning, and 10% in building operator training.

More than half (59%) of Owners/Managers said they collect energy usage data for all buildings they own. Another 20% said they collect this data for some of their buildings but not all.

- Fifteen percent admitted that they do not collect this data at all, while 6% were unsure.
- Of those who collect energy usage data for at least some of their buildings, 30% said they use the ENERGY STAR Portfolio Manager tool to do so. Less than one-quarter (23%) said they report the energy usage data they collect outside the company.
- In terms of disclosing their buildings' energy consumption to tenants, 38% said they only provide this to current/prospective tenants upon request, and 45% said they do not disclose this information to tenants at all.

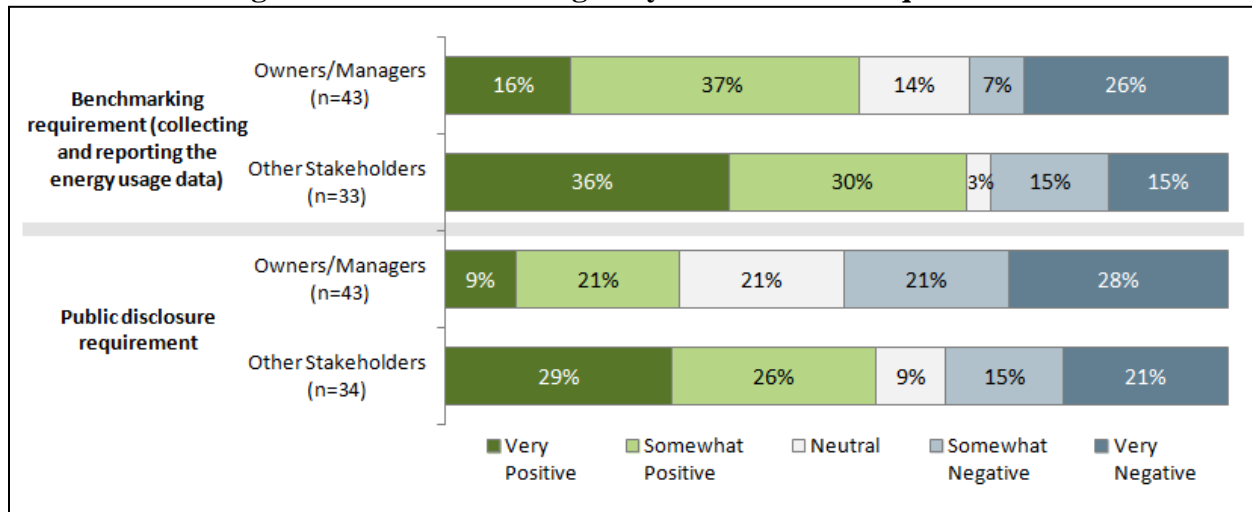
The following figures and text provide additional detail on the individual policies and certain details of specific policy options.

**Figure B-1. Mandatory Benchmarking and Disclosure**



- 58% of survey respondents felt positively about Commercial Building Energy Performance Benchmarking and Disclosure, and 31% felt negatively.
- As with most of the policies presented, Other Stakeholders (non-owners/managers) had a better reaction; 42% felt “very positive” about it, compared with only 9% of Owners/Managers.

**Figure B-2. Benchmarking Only vs. Disclosure requirement**



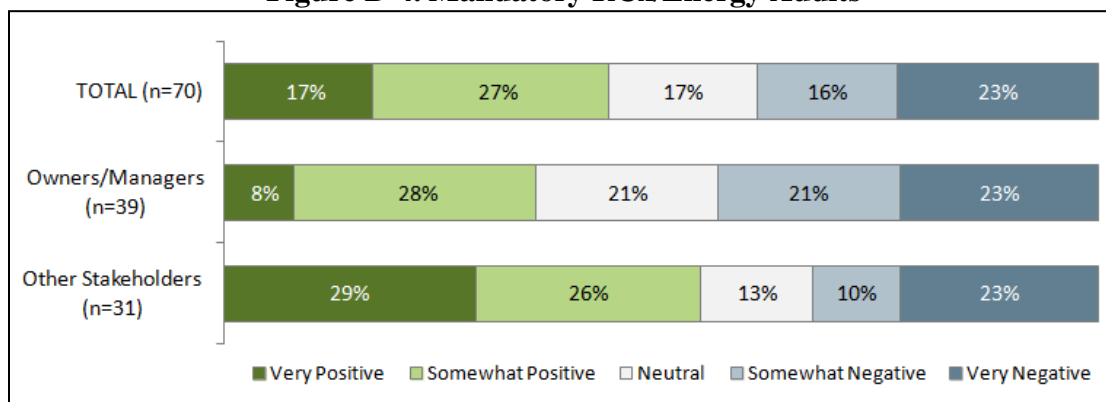
- The benchmarking requirement of Policy #1 had stronger support among survey respondents than the public disclosure requirement.
- More than half (53%) of Owners/Managers and 66% of Other Stakeholders felt positively about the benchmarking component.
- Both groups were less supportive of the public disclosure requirement, but Owners/Managers especially so; only 30% of Owners/Managers had a positive reaction to the benchmarking requirement, while 49% felt negatively about it.

**Figure B-3. Impact of Alternatives on Views of Mandatory Benchmarking and Disclosure**

How would alternatives/changes affect their views of this policy?		Would make them feel much/somewhat more positive	Would not affect their views	Would make them feel much/somewhat more negative	Mean
Increasing the minimum threshold (square footage) to which the requirement applies	Owners/Managers (n=40)	35%	53%	13%	3.28
	Other Stakeholders (n=29)	31%	45%	24%	3.07
Exempting specific sectors or building types	Owners/Managers (n=37)	51%	30%	19%	3.43
	Other Stakeholders (n=28)	39%	39%	21%	3.18
Making benchmarking voluntary for buildings for an initial period (e.g., two years) then making it mandatory if a percentage (e.g., 25%) of buildings in the County do not participate	Owners/Managers (n=40)	38%	38%	25%	3.15
	Other Stakeholders (n=30)	37%	40%	23%	3.10
Providing incentives for owners that voluntarily benchmark to help them achieve higher scores	Owners/Managers (n=40)	70%	20%	10%	4.05
	Other Stakeholders (n=30)	77%	23%	0%	4.17
Making benchmarking transaction-based (rather than annual) and limiting disclosure to real estate professionals, prospective tenants or buyers involved in specific transactions	Owners/Managers (n=39)	33%	44%	23%	3.10
	Other Stakeholders (n=27)	30%	30%	41%	2.89

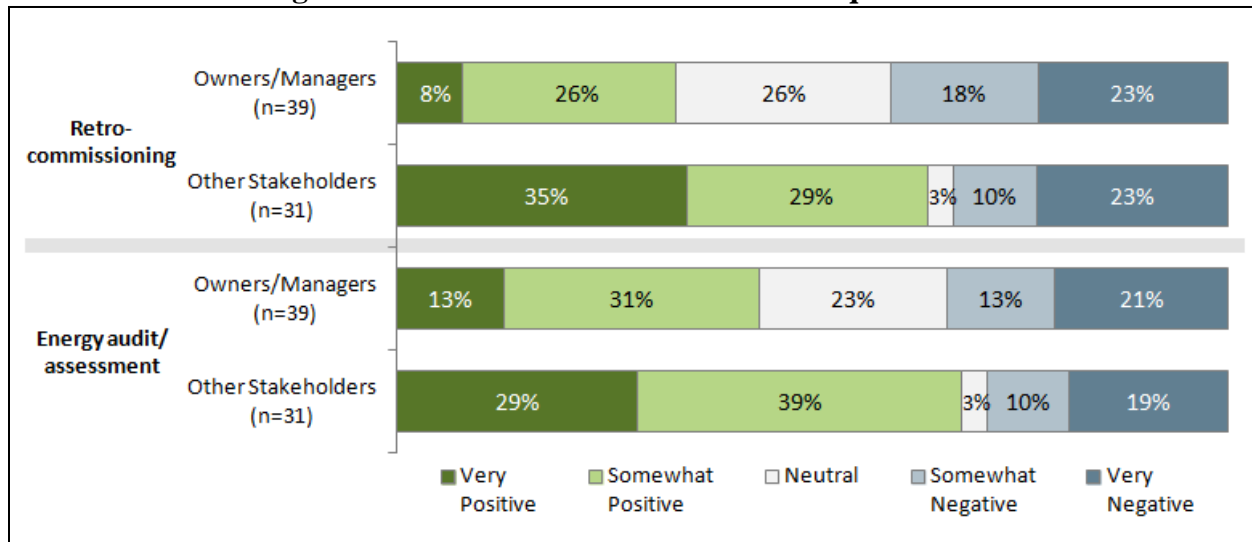
- The benchmarking requirement of Policy #1 had stronger support among survey respondents than the public disclosure requirement.
- More than half (53%) of Owners/Managers and 66% of Other Stakeholders felt positively about the benchmarking component.
- Both groups were less supportive of the public disclosure requirement, but Owners/Managers especially so; only 30% of Owners/Managers had a positive reaction to the benchmarking requirement, while 49% felt negatively about it.

**Figure B-4. Mandatory RCx/Energy Audits**



- Among all respondents, Policy #2 had the lowest percentage of positive ratings (44%). Nearly as many respondents (39%) had a negative response to it.
- Of all of the policies presented, Owners/Managers had the least positive response to Policy #2.
- While this policy was also among Other Stakeholders' least favorites, they were much more likely to feel supportive of it than the Owners/Managers. More than half (55%) of Other Stakeholders had a positive response (compared with 36% of Owners/Managers), and Other Stakeholders were particularly likely to feel “very positive” (29% vs. only 8% of Owners/Managers).

**Figure B-5. Reactions to RCx vs. Audit Requirements**



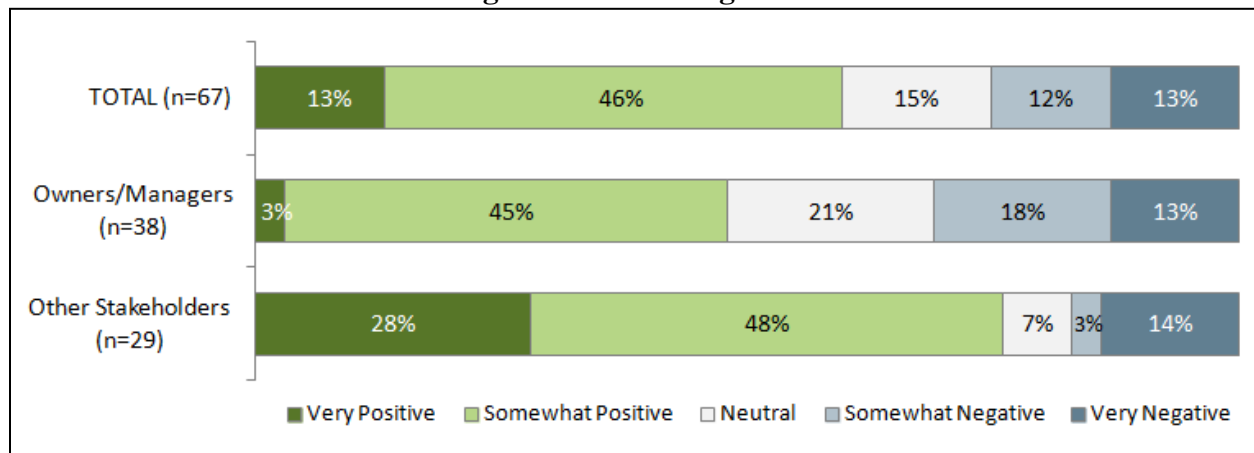
- Owners/Managers were more comfortable with the energy audit/assessment component of Policy #2 (44% positive, 34% negative) than they were with the retro-commissioning aspect (34% positive, 41% negative).
- Other Stakeholders felt slightly more favorably toward the energy audit/assessment (68% positive, 29% negative) than the retro-commissioning (64% positive, 33% negative).

**Figure B-6. Impact of Alternatives on Views on RCx-Audit Alternatives**

How would alternatives/changes affect their views of this policy?		Would make them feel much/somewhat more positive	Would not affect their views	Would make them feel much/somewhat more negative	Mean
Increasing the minimum threshold (square footage) to which the requirements apply	Owners/Managers (n=38)	32%	55%	13%	3.29
	Other Stakeholders (n=25)	24%	56%	20%	3.04
Exempting specific sectors or building types	Owners/Managers (n=35)	43%	37%	20%	3.34
	Other Stakeholders (n=24)	17%	42%	42%	2.75
Extending the effective date/phase-in period	Owners/Managers (n=35)	29%	60%	11%	3.17
	Other Stakeholders (n=25)	28%	56%	16%	3.12
Exempting buildings if owners/managers demonstrate that such studies have been conducted within the last five years and that performance improvements of at least 10% have been documented through benchmarking data	Owners/Managers (n=38)	53%	37%	11%	3.63
	Other Stakeholders (n=27)	48%	41%	11%	3.37
Exempting buildings if they demonstrate that the subject building has achieved the ENERGY STAR building label, and is maintaining that label in subsequent years	Owners/Managers (n=38)	55%	37%	8%	3.82
	Other Stakeholders (n=27)	56%	41%	4%	3.63
Exempting buildings if management staff maintain a certification such as Certified Energy Manager or BOMI's Systems Management Technician designation	Owners/Managers (n=35)	49%	37%	14%	3.46
	Other Stakeholders (n=24)	29%	50%	21%	3.08

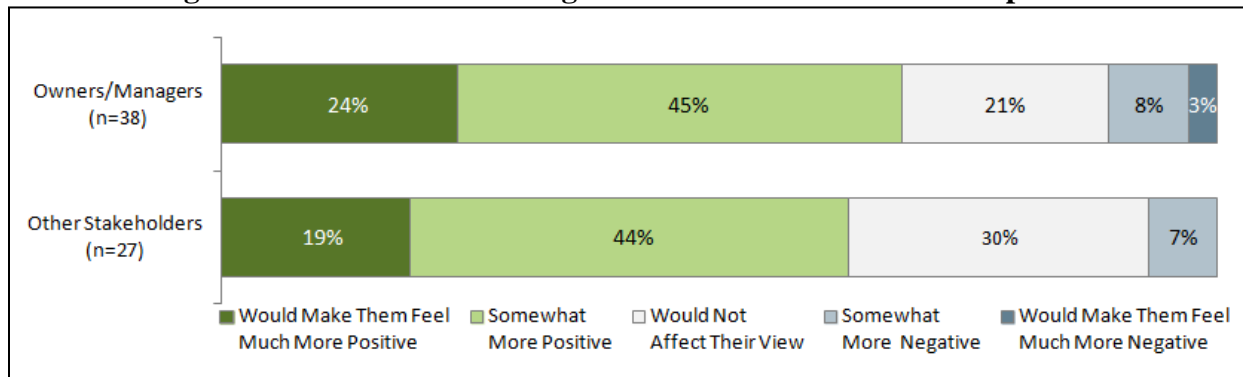
- More than 50% of both groups said that they would feel more positive about Policy #2 if it exempts buildings that have achieved the ENERGY STAR building label and continue to maintain that label in subsequent years.
- Both groups also showed interest in exempting buildings where similar studies have been conducted in the last five years and performance improvements of 10%+ have been documented through benchmarking data.

**Figure B-7. Building Codes**



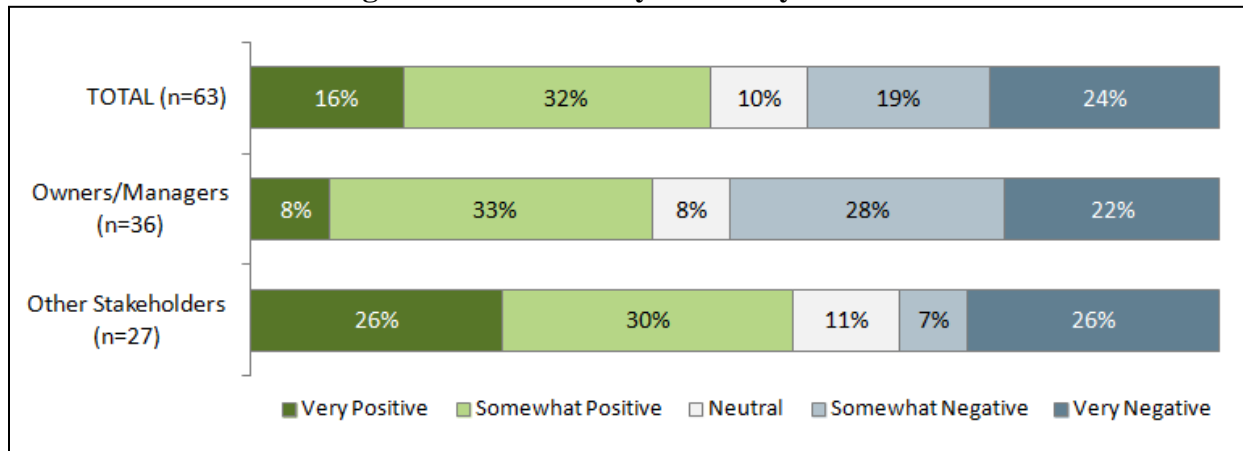
- Very few Owners/Stakeholders (3%) had a “very positive” response to Policy #3. However, another 45% felt “somewhat positive” about it. 31% had a negative response.
- More than three-quarters (76%) of Other Stakeholders felt very or somewhat positive about Policy #3.

**Figure B-8. Effects of Allowing Performance Based Code Compliance**



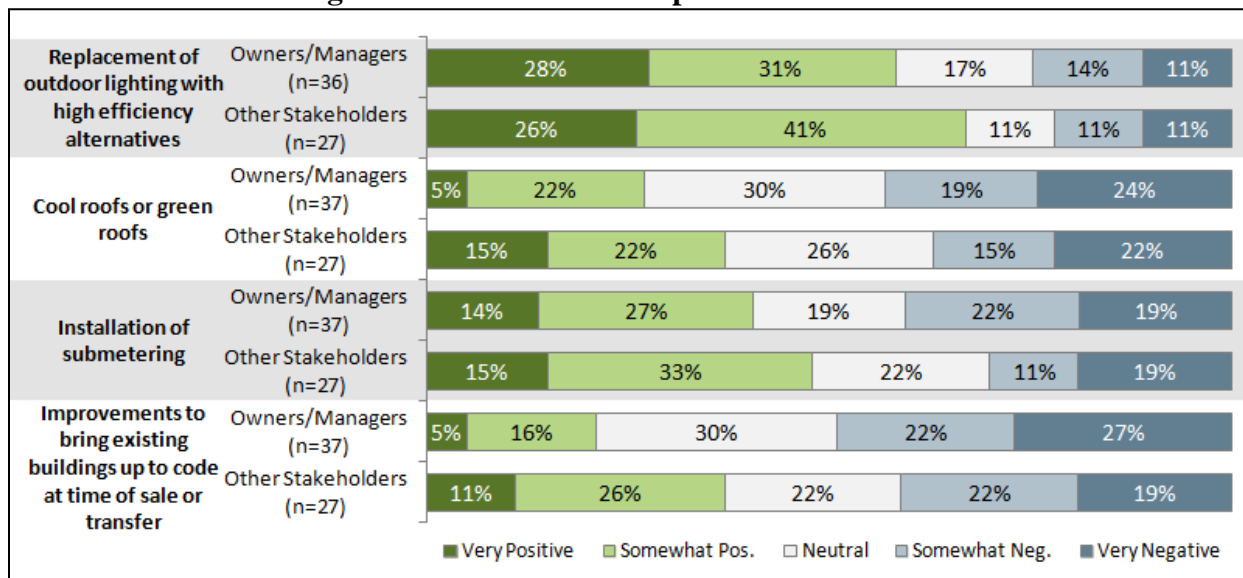
- Both respondent groups indicated that they would tend to feel more positively about Policy #3 if the County created performance-based compliance methods that offered building owners more flexibility in meeting the building code requirements.
- Among Owners/Managers, 69% said this would make them feel more positive (only 11% would feel more negative), and 63% of Other Stakeholders said it would make them feel more positive (7% would feel more negative).

**Figure B-9. Mandatory Efficiency Retrofits**



- Of all policies presented, Policy #4 had the lowest ratings overall, with less than half (48%) of all respondents giving it positive ratings and 43% giving it negative ratings.
- For both groups, Policy #4 received the highest percentage of negative responses of any policy, with 33% of Other Stakeholders and 50% of Owners/Managers feeling somewhat or very negative about it.

**Figure B-10. Reactions to Specific Retrofit Items**



- Survey respondents tended to have a positive reaction to Policy #4's requirement of replacing outdoor lighting with high efficiency alternatives (59% of Owners/Managers and 67% of Other Stakeholders).
- Both groups had a less positive response to the other requirements listed.
  - Owners/Managers were split on installing submetering (41% positive, 41% negative), and those with negative responses outnumbered those with positive responses for cool/green roofs and improvements at the time of sale/transfer.

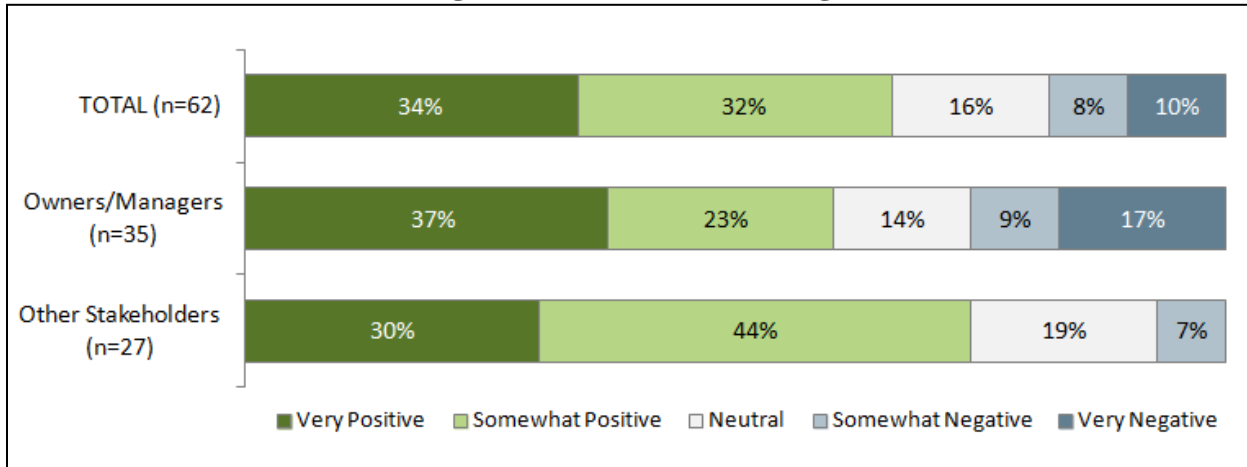
- Nearly half (48%) of Other Stakeholders felt positively about installing submetering, but cool/green roofs and improvements to bring existing buildings up to code at the time of sale/transfer only appealed to 37%.

**Figure B-11 Impact of Alternatives/Changes**

How would alternatives/changes affect their views of this policy?		Would make them feel much/somewhat more positive	Would not affect their views	Would make them feel much/somewhat more negative	Mean
Requiring replacement or installation on a set timeline (e.g., within 5 years) without incentives	Owners/Managers (n=35)	17%	46%	37%	2.69
	Other Stakeholders (n=25)	24%	40%	36%	2.80
Providing incentives for replacement for the first five years and then mandating specific alternatives thereafter	Owners/Managers (n=35)	46%	37%	17%	3.34
	Other Stakeholders (n=26)	54%	27%	19%	3.31
Exempting organizations that benchmark their energy performance and achieve a minimum score	Owners/Managers (n=34)	50%	32%	18%	3.44
	Other Stakeholders (n=25)	48%	36%	16%	3.44
Allow organizations to pay a “compliance fee” in lieu of adopting an action; the funds would be used to fund other community energy efficiency projects (e.g., incentives)	Owners/Managers (n=35)	9%	34%	57%	2.23
	Other Stakeholders (n=25)	20%	28%	52%	2.56

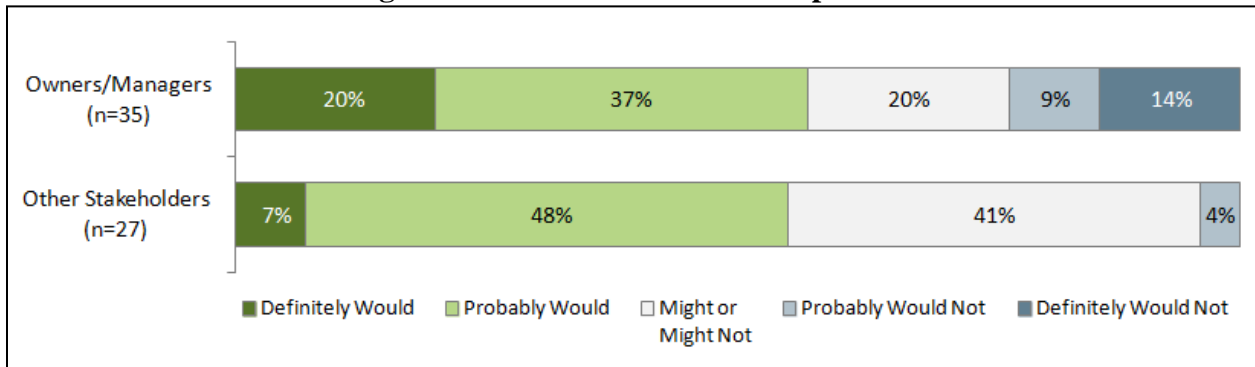
- Of the potential modifications provided for Policy #4, exempting organizations that benchmark their energy performance and achieve a minimum score had the most appeal, followed by providing incentives for replacement for the first five years and then mandating specific alternatives thereafter.
- Between 40% and 46% of respondents indicated that requiring replacement or installation on a set timeline (e.g., within 5 years) without incentives would not affect their view of Policy #4, and 36%/37% said this would make them feel more negative about it.
- Allowing organizations to pay a “compliance fee” in lieu of adopting an action, with those funds going toward other community energy projects (e.g., incentives) elicited a negative response from more than half (52% to 57%) of those surveyed.

**Figure B-12. PACE Financing**



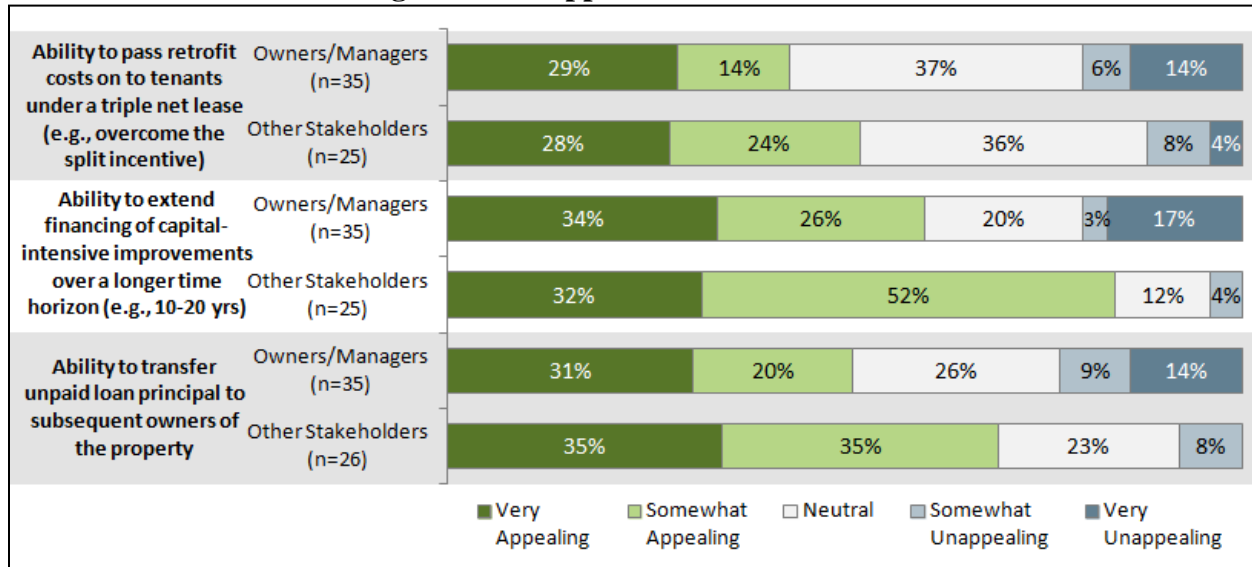
- Policy #5 was generally well-received by both groups surveyed.
- Of all the policies presented, Policy #5 had the highest percentage of “very positive” ratings from Owners/Managers (37%).
- Policy #5 also received the fewest negative ratings from Other Stakeholders; only 7% felt “somewhat negative” and none felt “very negative” about it.

**Figure B-13. Likelihood to Participate in PACE**



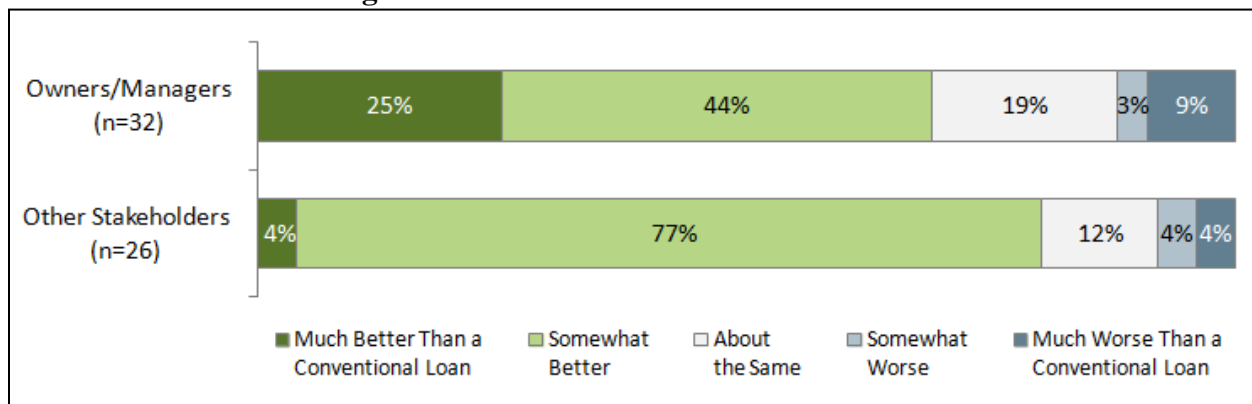
- 20% of Owners/Managers surveyed said they “definitely would” participate in a PACE program if they needed financing for energy efficiency projects. Another 37% said they “probably would,” for a total of 57% who would lean toward participating in a PACE program. 23% would lean against participating.
- Other Stakeholders are presumably less likely to be in this position, which may account for the 41% who said they “might or might not” participate in a PACE program in this scenario. However, even more (48%) said that they “probably would” participate, for a total of 55% who indicated likelihood in participation. Only 4% said they “probably would not” and none would rule it out entirely.

**Figure B-14. Appeal of PACE Features**



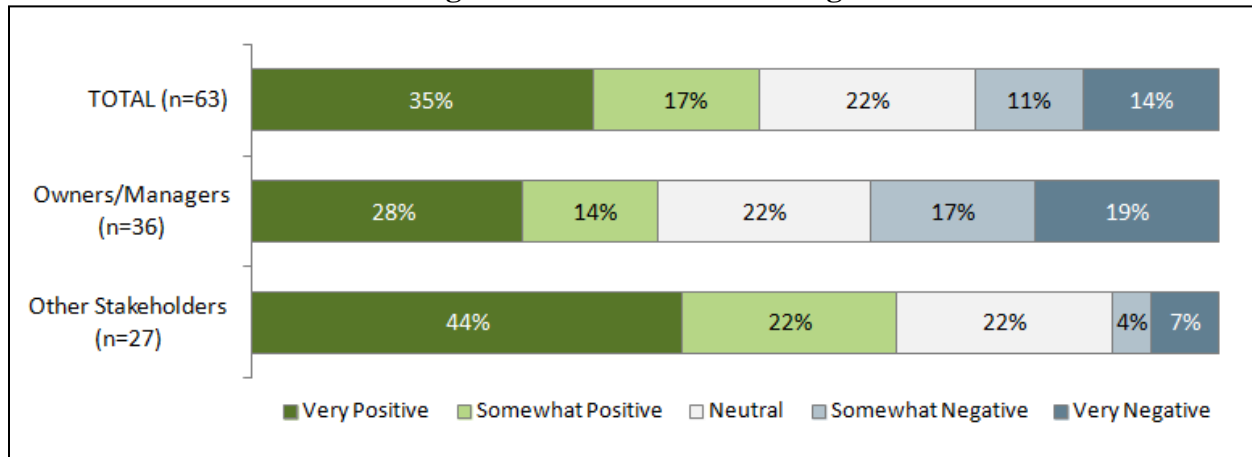
- The ability to extend financing of capital-intensive improvements over a longer time horizon (e.g., 10–20 years) was the most appealing feature of PACE for both groups surveyed (60% of Owners/Managers and 84% of Other Stakeholders found it at least somewhat appealing).
- The ability to transfer unpaid loan principal to subsequent owners of the property appealed to 51% of Owners/Managers and 70% of Other Stakeholders.
- 36% to 37% of those surveyed had a neutral response to the ability to pass retrofit costs on to tenants under a triple net lease (e.g., overcome the split incentive), while 43% of Owners/Managers and 52% of Other Stakeholders found this appealing.

**Figure B-15. PACE vs. Conventional Loans**



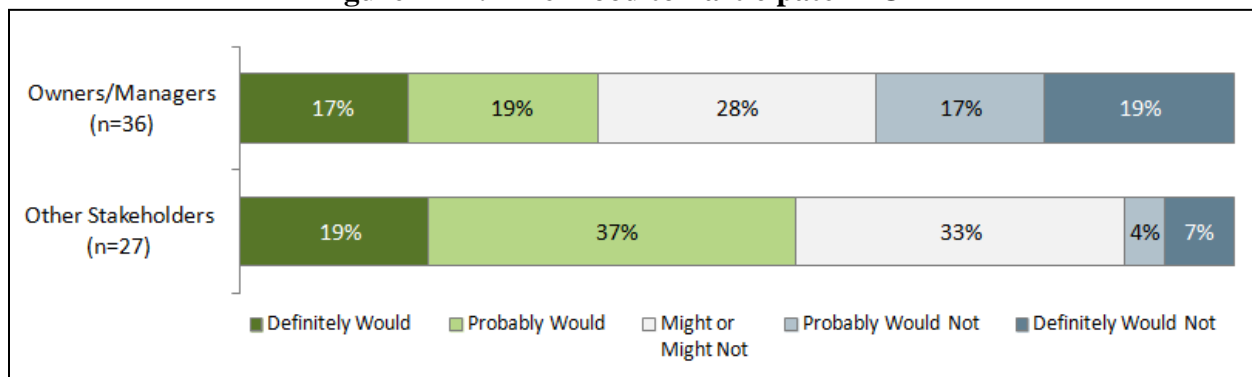
- One-quarter (25%) of Owners/Managers thought that PACE financing was “much better” than a conventional loan. In all, 69% saw it as having an edge over conventional loans.
- While few Other Stakeholders (4%) were sure that PACE was “much better,” a total of 81% thought it was at least somewhat better than conventional loans.

**Figure B-16. On-Bill Financing**



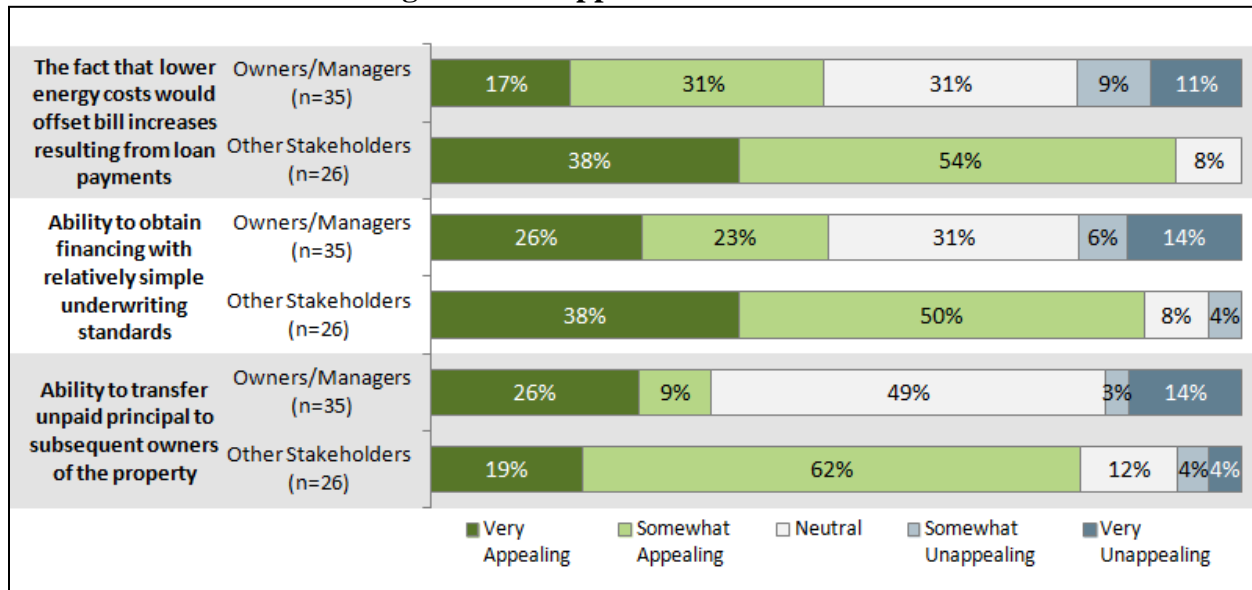
- Owners/Managers were much less positive about On-Bill Financing in Policy #6 (42%) than they were about PACE financing in Policy #5 (60%).
- Similarly, fewer Other Stakeholders were positive about Policy #6 (66%) than about Policy #5 (74%). However, of all the policies presented, Policy #6 had the highest percentage of “very positive” ratings from Other Stakeholders (44%).

**Figure B-17. Likelihood to Participate in OBF**



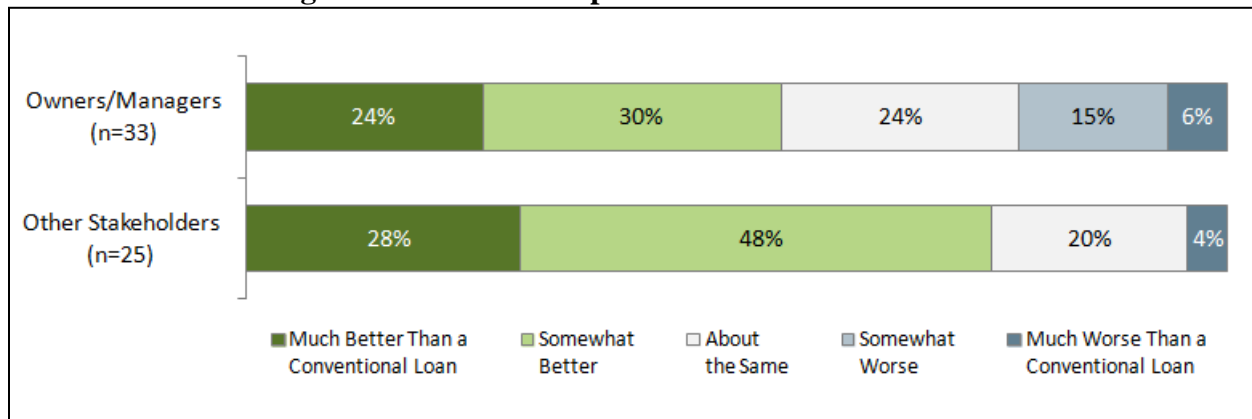
- Owners/Managers were generally split as to whether they would participate in an OBF program if they needed financing for energy efficiency projects, with 36% leaning toward participating and 36% leaning against participating.
- In all, 56% of Other Stakeholders leaned toward participating in an OBF program. This is roughly the same as those who did so for PACE, but out of this 56%, OBF garnered more who “definitely would” participate (19% compared with 7% for PACE).

**Figure B-18. Appeal of OBF Features**



- Nearly half (48% to 49%) of Owners/Managers found it appealing that lower energy costs would offset bill increases resulting from loan payments and that OBF offers the ability to obtain financing with relatively simple underwriting standards. This group was especially likely to find the simple underwriting standards “very appealing” (26%).
- While 26% also found the ability to transfer unpaid principal to subsequent owners of the property “very appealing,” 49% had a neutral response to this feature.
- Other Stakeholders generally found all of these features appealing, from 81% for transferring unpaid principal to subsequent owners of the property to 92% for lower energy costs offsetting bill increases resulting from loan payments.

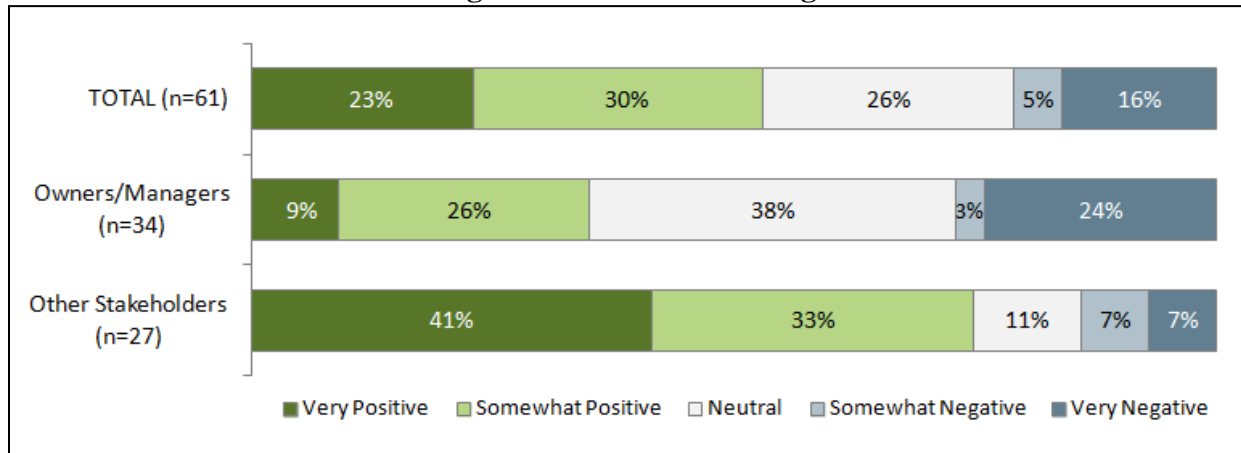
**Figure B-19. OBF Compared to Conventional Loans**



- Among Owners/Managers, the percentage who rated OBF as “much better” than a conventional loan is on par with PACE. However, fewer rated it as “somewhat better” (30% vs. 44% for PACE), for a total of 54% who saw OBF as at least somewhat better than a conventional loan (compared with 69% for PACE).

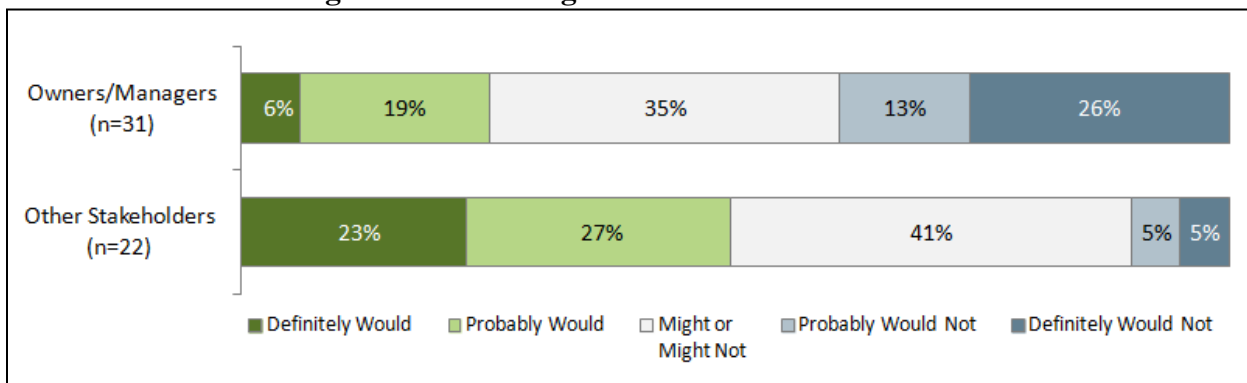
- In contrast, Other Stakeholders indicated a stronger preference for OBF than they did for PACE. 28% said OBF was “much better” than a conventional loan, versus only 4% for PACE.

**Figure B-20. Green Leasing**



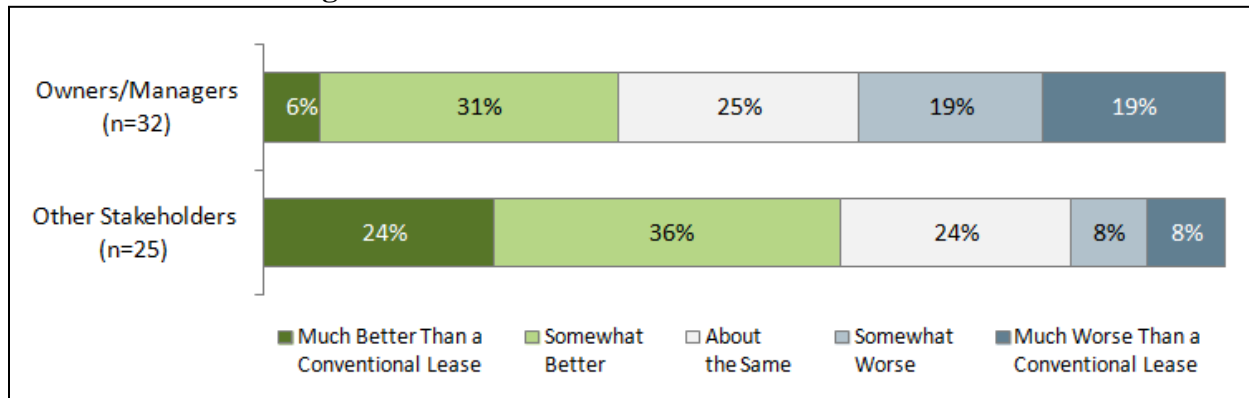
- Other Stakeholders were far more positive about Policy #7 than Owners/Managers were.
- Among Owners/Managers, 35% felt positively; this is lower than any other policy presented. Furthermore, 24% felt “very negative” about Policy #7; this is higher than any other policy.
- In contrast, Other Stakeholders were fairly enthusiastic about this policy, with 41% feeling “very positive” about it and a total of 74% feeling at least somewhat positive.

**Figure B-21. Willingness to Enter a Green Lease**



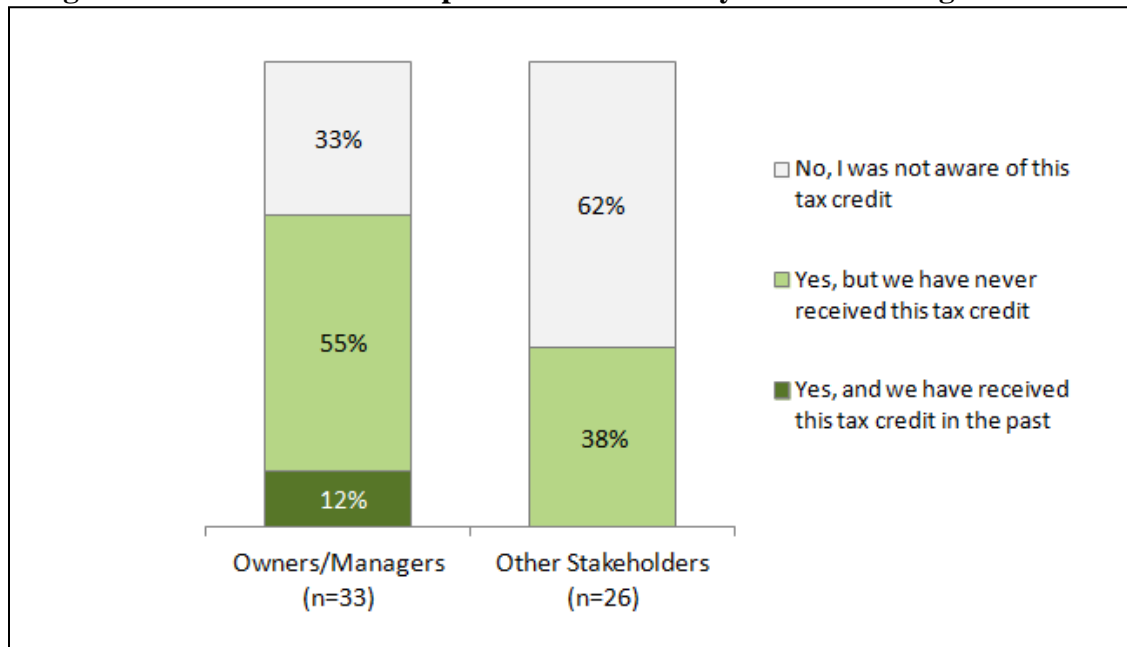
- Although 50% of Other Stakeholders indicated that they would be likely to adopt a green lease, only 25% of Owners/Managers felt similarly.
- 39% of Owners/Managers indicated that they were unlikely to adopt a green lease, with 26% saying that they “definitely would not.”

**Figure B-22. Green Lease vs. Conventional Lease**



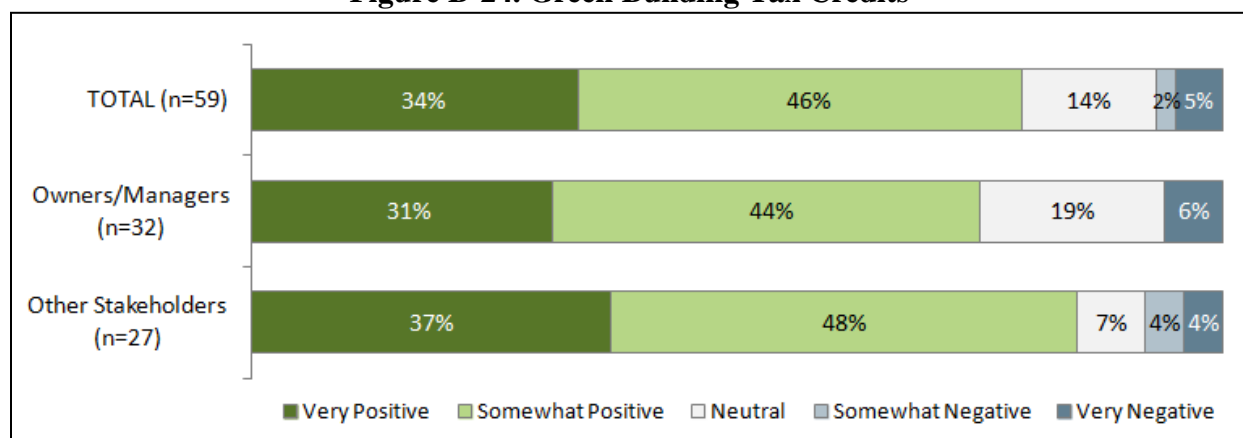
- Among Owners/Managers, 37% considered green leasing to be at least somewhat better than a conventional lease, and 38% thought it was at least somewhat worse. However, those who thought it was “much better” (6%) were outnumbered by those who thought it was “much worse” (19%).
- 60% of Other Stakeholders thought that green leasing was at least somewhat better than a conventional lease, with 24% saying that it was “much better.”

**Figure B-23. Awareness of/Experience with County Green Building Tax Credit**



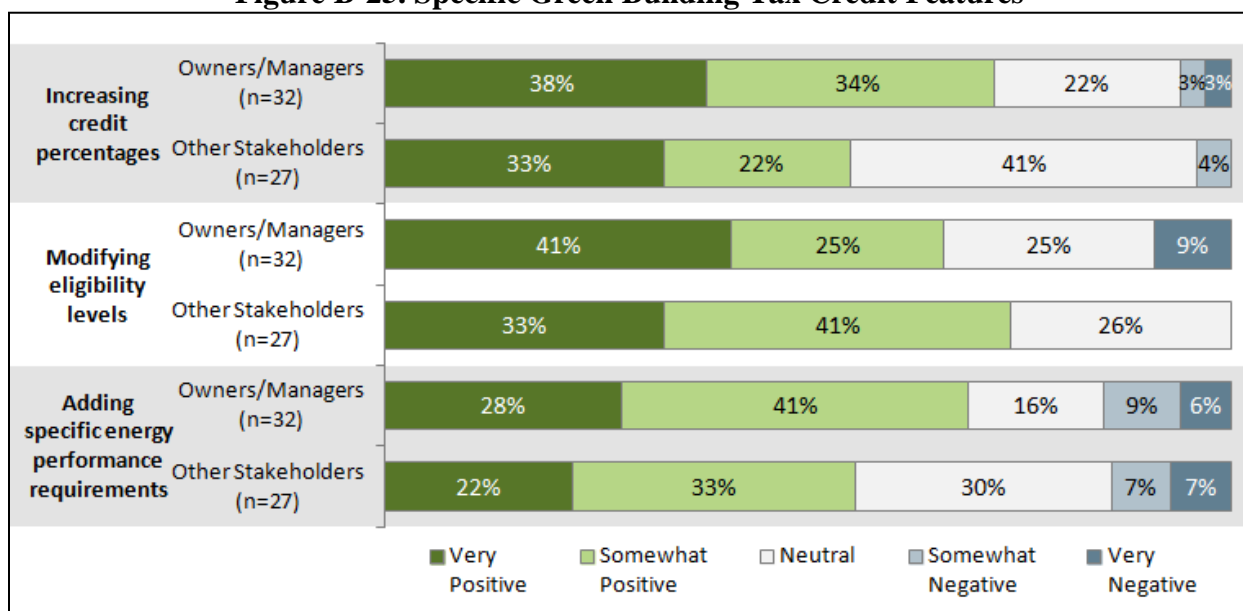
- About two-thirds (67%) of Owners/Managers were aware of Montgomery County’s existing Green Building Tax Credit, and 12% had received this tax credit before.
- In contrast, 38% of Other Stakeholders had heard of this tax credit and none had ever received it.

**Figure B-24. Green Building Tax Credits**



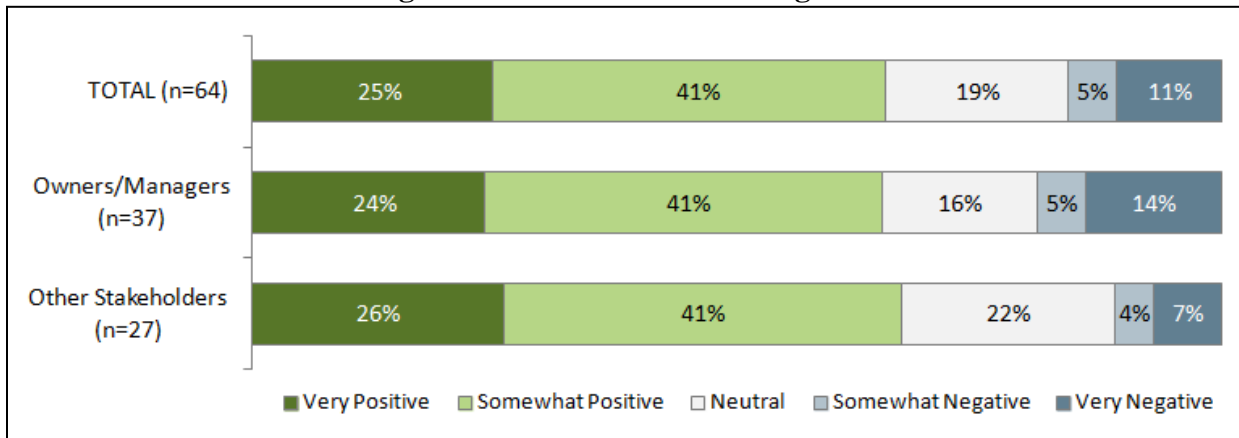
- Policy #8 was the most universally well-received policy presented. Three-quarters (75%) of Owners/Managers and 85% of Other Stakeholders had a positive response to Policy #8.

**Figure B-25. Specific Green Building Tax Credit Features**



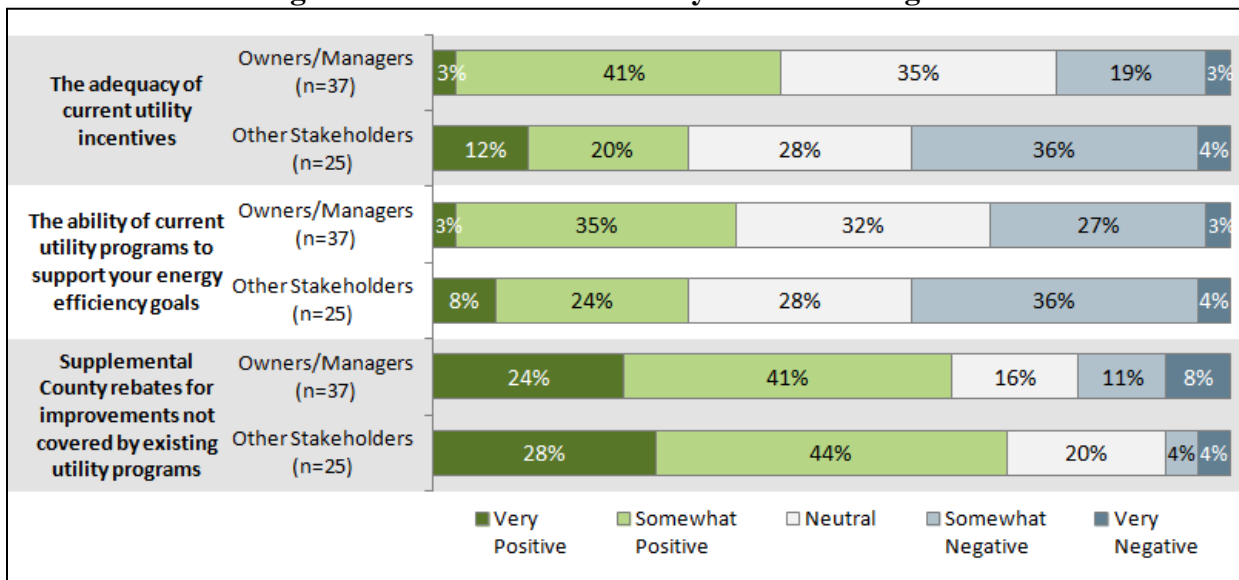
- Owners/Managers were most likely to feel at least somewhat positive about increasing credit percentages (72%), while Other Stakeholders were most positive about modifying eligibility levels (74%).

**Figure B-26. Rebate/Grant Programs**



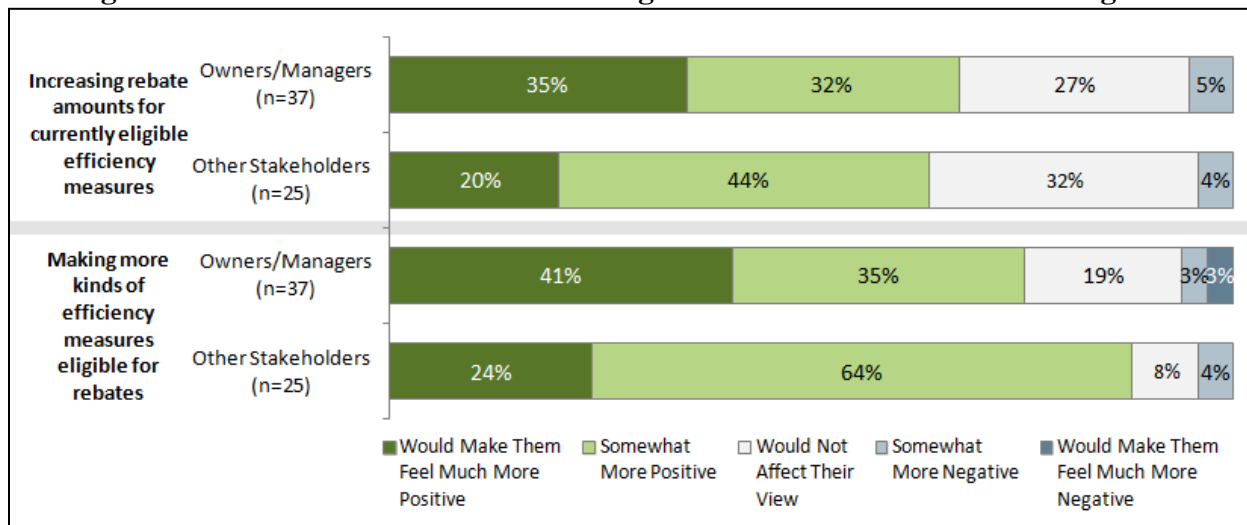
- Both groups surveyed tended to have a positive response to Policy #9, with roughly one-quarter (24% to 26%) feeling “very positive” about it and about two-thirds (65% to 67%) feeling at least somewhat positive.

**Figure B-27. Views on Currently Available Programs**



- Both groups indicated the most support for current supplemental County rebates for improvements not covered by existing utility programs.
- Respondents were somewhat less positive about the adequacy of current utility incentives and the ability of current utility programs to support their energy efficiency goals.

**Figure B-28. Effects of Alternatives/Changes on Views of Rebate/Grant Programs**



- A majority of those surveyed indicated that they would feel even more positively about Policy #9 if the County were to implement the alternatives/changes shown below.
- 67% of Owners/Managers and 64% of Other Stakeholders favored increasing rebate amounts for currently eligible efficiency measures.
- Respondents were especially supportive of making more kinds of efficiency measures eligible for rebates; 76% of Owners/Managers and 88% of Other Stakeholders said they would feel more positive with this change.

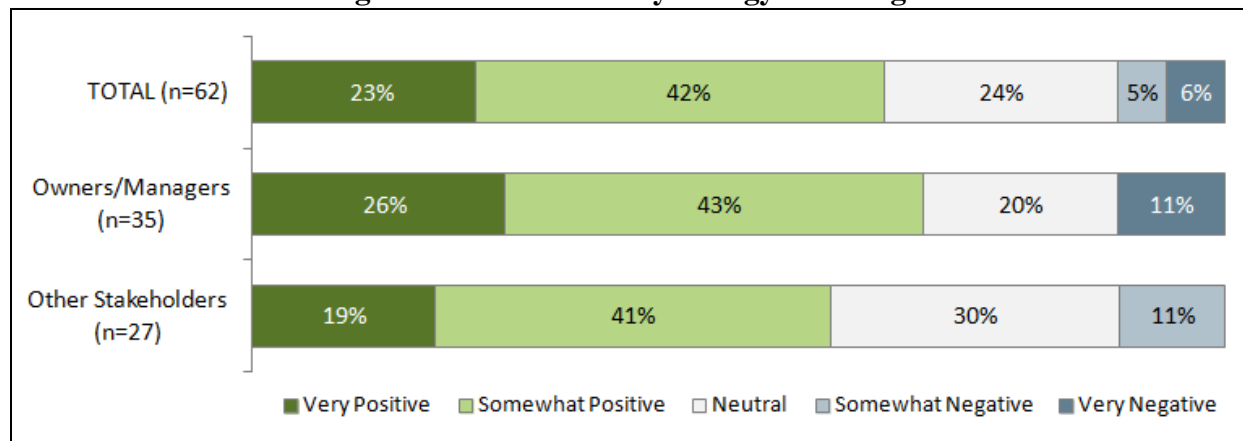
**Figure B-29. Reactions to Potential Sources of Funding for County Energy Incentives**

Reactions to Potential Funding Sources for Energy Incentives		Positive	Neutral	Negative	Mean
Increasing the County's energy tax rate	Owners/Managers (n=37)	22%	22%	57%	2.38
	Other Stakeholders (n=26)	38%	12%	50%	2.77
Redirecting existing energy tax revenues from other County budget priorities	Owners/Managers (n=37)	41%	32%	27%	3.11
	Other Stakeholders (n=25)	44%	28%	28%	3.20
Finding new revenues from other County sources	Owners/Managers (n=37)	30%	35%	35%	2.84
	Other Stakeholders (n=25)	36%	44%	20%	3.16
Non-compliance fees or alternative compliance payments for buildings that do not comply with other County energy policies	Owners/Managers (n=37)	38%	19%	43%	2.81
	Other Stakeholders (n=25)	52%	20%	28%	3.08

- Owners/Managers were most likely to feel positively (and least likely to feel negatively) about redirecting existing energy tax revenues from other County budget priorities (41% positive, 27% negative). Redirecting existing energy tax revenues was also one of the more plausible funding sources among Other Stakeholders.

- Finding new revenues from other County sources had the lowest percentage of negative responses from Other Stakeholders (20%) and the highest percentage of neutral responses from Owners/Managers (35%).
- While non-compliance fees or alternative compliance payments had a higher positive response than other funding sources, it also had some of the highest percentages of “very negative” responses from both groups (24% of Owners/Managers and 20% of Other Stakeholders) (not shown).
- Increasing the County’s energy tax rate had the most negative responses from both groups (57% of Owners/ Managers and 50% of Other Stakeholders).

**Figure B-30. Community Energy Challenges**



- Owners/Managers were generally quite supportive of Policy #10, with 69% saying they felt positive about it. This is the second-highest percentage of positive responses from Owners/Managers (after Policy #8 at 75%).
- Policy #10 received the highest percentage of neutral responses from Other Stakeholders (30%) of any policy presented, indicating that this was a less pertinent policy for them. However, only 11% felt “somewhat negative” about Policy #10, and none felt “very negative.”

**Figure B-31. Appeal of Community Energy Challenge Features**

How do they feel about the following aspects of this policy?		Very/somewhat positive	Neutral	Very/somewhat negative	Mean
The County Executive would invite businesses and organizations to accept this challenge, including a specific savings goal	Owners/Managers (n=36)	67%	19%	14%	3.67
	Other Stakeholders (n=26)	65%	19%	15%	3.73
The fact that participation would be voluntary	Owners/Managers (n=36)	67%	25%	8%	4.06
	Other Stakeholders (n=26)	62%	23%	15%	3.77
Committing to a specific energy savings target	Owners/Managers (n=36)	72%	14%	14%	3.75
	Other Stakeholders (n=26)	69%	27%	4%	3.81
Measuring performance against the target using benchmarking software	Owners/Managers (n=36)	67%	17%	17%	3.69
	Other Stakeholders (n=26)	77%	15%	8%	3.88
Engaging people across my organization to achieve savings	Owners/Managers (n=36)	75%	14%	11%	3.97
	Other Stakeholders (n=26)	81%	15%	4%	4.04
Getting public recognition for our voluntary achievements	Owners/Managers (n=36)	61%	25%	14%	3.81
	Other Stakeholders (n=26)	77%	19%	4%	4.00
Getting technical assistance, tools, and resources from the County	Owners/Managers (n=34)	74%	15%	12%	3.97
	Other Stakeholders (n=26)	77%	19%	4%	4.04
Preferential incentives, such as rebates, available only to challenge participants	Owners/Managers (n=36)	75%	14%	11%	3.94
	Other Stakeholders (n=26)	73%	15%	12%	3.81

- All aspects of Policy #10 were perceived as positive by a majority of respondents; the percentage of positive responses ranged from 61% to 75% for Owners/Managers and from 62% to 81% for Other Stakeholders.

## Figure B-32. Stakeholder Survey Instrument

### Montgomery County Commercial Buildings Energy Efficiency Policy Study Stakeholder Survey Instrument

LANDING PAGE

#### Welcome to the Montgomery County Commercial and Multi-Family Building Survey!

This survey is part of the Montgomery County Department of Environmental Protection's current effort to identify ways to meet the County's Climate Action Plan goal of reducing commercial energy use by 25% by 2020. As a stakeholder in the commercial energy area, your input will help the County identify the most effective set of policies and programs.

**As you go through the survey, you will be able to skip policy questions that are not applicable or do not interest you. You will be able to save your work and come back to the survey if you can't complete it in one sitting by clicking the "Save and Continue Later" button (see next page). We estimate this survey should take approximately 20 minutes to complete.**

Each user is assigned a unique ID. If you know of additional individuals who should take this survey, please contact [ICF International](#).

Your time and effort in completing this survey is greatly appreciated. Thanks again for helping the County in this study.

**To begin the survey, click the "Next" button below.**

//PAGE BREAK//

//ASK ALL//

Q1 Do you own or manage any buildings in Montgomery County, Maryland? Please select all that apply.

Yes, own //SKIP TO Q3//

Yes, manage //SKIP TO Q3//

No

//PAGE BREAK//

//ASK IF Q1=No//

Q2 Which of the following situations apply to you? Please select all that apply.

We lease/rent space in Montgomery County, MD //SKIP TO P0//

We provide services to commercial buildings in Montgomery County, MD //SKIP TO P0//

Other (please specify) \_\_\_\_\_ //SKIP TO P0//

//PAGE BREAK//

//ASK IF Q1= Yes, own/Yes, manage//

**Q3 The following information will help the County understand the market better and formulate more effective policies.**

What is the primary usage type of the building(s) you own/manage in Montgomery County, MD?  
Please select one in each column.

	Own	Manage
<b>Not applicable</b>	(99)	(99)
Office	(1)	(1)
Retail	(2)	(2)
Grocery	(3)	(3)
Restaurant	(4)	(4)
Warehouse/Storage	(5)	(5)
Health Care	(6)	(6)
Hotel/Lodging	(7)	(7)
Religious Worship	(8)	(8)
High-Rise Multifamily Residential (5+ stories)	(9)	(9)
Low-Rise Multifamily Residential (1-4 stories)	(10)	(10)
Other (please specify below)	(11)	(11)

Q3oth If you selected "Other" above, please explain in the box below.

//OPEN-END//

//ASK IF Q1= Yes, own/Yes, manage//

**Q4** Thinking only about buildings in that primary usage type, what sizes of buildings do you typically own/manage in Montgomery County, MD?

	Number You Own	Number You Manage
Buildings smaller than 10,000 square feet	//Q4A_1: number entry field//	//Q4A_2: number entry field//
Buildings 10,000-49,999 square feet	//Q4B_1: number entry field//	//Q4B_2: number entry field//
Buildings 50,000-99,999 square feet	//Q4C_1: number entry field//	//Q4C_2: number entry field//
Buildings 100,000 square feet or larger	//Q4D_1: number entry field//	//Q4D_2: number entry field//
Total	//sum Q4A_1 thru Q4 D_1//	//sum Q4A_2 thru Q4D_2//

//PAGE BREAK//

//ASK IF Q1= Yes, own/Yes, manage//

**Q5** From your perspective, how much of a barrier do the following factors pose to your efforts to make your building(s) more energy efficient?

	Major Barrier to Energy Efficiency	Minor Barrier to Energy Efficiency	Not a Barrier to Energy Efficiency	Not Sure
Q5A. Not knowing how much energy you use	(3)	(2)	(1)	(9)

Q5B. Not knowing how your energy usage compares with that of similar buildings	(3)	(2)	(1)	(9)
Q5C. Lack of information about how to operate buildings more efficiently	(3)	(2)	(1)	(9)
Q5D. Lack of information about making energy-saving improvements to your building(s)	(3)	(2)	(1)	(9)
Q5E. The time and “hassle” of identifying and implementing efficiency improvements	(3)	(2)	(1)	(9)
Q5F. Lack of capital to pay for efficiency improvements	(3)	(2)	(1)	(9)
Q5G. Different interests between those who pay energy bills and those who make energy efficiency investment decisions (e.g., between owners/managers and tenants)	(3)	(2)	(1)	(9)
Q5H. Other (please explain below)	(3)	(2)	(1)	(9)

Q5oth If you selected “Other” above, please explain in the box below.

//OPEN-END//

//PAGE BREAK//

//ASK IF Q1= Yes, own/Yes, manage//

Q6 How do you pay for energy efficiency improvements now? (Please select all that apply.)

- 1 Through internal funds
- 2 Conventional loans with established lenders
- 3 Performance contracting with energy services companies
- 4 Short-term vendor financing (e.g., 6 months no interest)
- 5 Other (please explain): \_\_\_\_\_
- 6 Not applicable; we have not made any energy efficiency improvements

//ASK IF Q1= Yes, own/Yes, manage//

Q7 Have you participated in any of the following utility programs? (Please select all that apply.)

- 1 Prescriptive rebates, in which utilities offer specific cash rebates for specific energy efficiency measures
- 2 Custom rebates, in which customers propose their own energy efficiency projects and utilities pay incentives based on formulas set by the program
- 3 Retro-commissioning (RCx), which involves a sophisticated “tune-up” of building systems (typically involving heating, cooling, ventilation, and automatic control systems)
- 4 Builder Operator Training, where the utility provides incentives to train operations and management staff on energy efficient practices (e.g., Association of Energy Engineers Certified Energy Manager Training, BOMI Energy Management and Controls Training)
- 5 None of the above

//PAGE BREAK//

//ASK IF Q1=Yes, own/Yes, manage//

Q8 What experience do you (or your organization) have with collecting energy usage data?

- 1 We collect this data for all buildings I/we manage or own
- 2 We collect this data for some buildings I/we manage or own but not all of them
- 3 We do not collect this data for any buildings //SKIP TO Q12//
- 4 Not sure //SKIP TO Q12//

//PAGE BREAK//

//ASK IF Q8=Collect data for some or all buildings//

Q9 Does your organization use the ENERGY STAR® Portfolio Manager tool to track energy consumption?

- 1 Yes, we use Portfolio Manager
- 2 No, we use something else (please specify): \_\_\_\_\_
- 3 Not sure

//ASK IF Q8=Collect data for some or all buildings//

Q10 Do you report the energy usage data you collect?

- 1 We report this data outside the company
- 2 We do not report this data outside the company
- 3 Not sure

//PAGE BREAK//

//ASK IF Q8=Collect data for some or all buildings//

Q11 Do you currently disclose the energy consumption of any of your buildings to current and/or prospective tenants? (Please select all that apply.)

- 1 We disclose this information to current tenants
- 2 We disclose this information to prospective tenants
- 3 We only disclose this information to current/prospective tenants upon request
- 4 None of the above

//PAGE BREAK//

//ASK IF Q1= Yes, own/Yes, manage//

Q12 Do you own or manage any buildings outside of Montgomery County, MD?

- 1 Yes, in the District of Columbia
- 2 Yes, elsewhere
- 3 No //SKIP TO P0//
- 4 Not sure //SKIP TO P0//

//PAGE BREAK//

//ASK IF Q12= Yes, in DC or Yes, elsewhere//

Q13 Of the buildings you own or manage outside Montgomery County, are any of them currently subject to mandatory energy performance benchmarking/disclosure requirements? (Please select all that apply.)

- 1 Yes, we own/manage buildings in the District of Columbia that are subject to such requirements
- 2 Yes, We own/manage buildings in other cities that are subject to such requirements (please specify cities): \_\_\_\_\_
- 3 No, we do not own/manage any buildings that are subject to such requirements

//PAGE BREAK//

//ASK ALL//

P0 Next, we would like to show you several potential policies for buildings in Montgomery County, MD and get your thoughts on them. As a reminder, while we hope you will share feedback on all of the policies, you may skip policies or questions that you do not feel apply to you or that you do not wish to answer. Also, you do not need to complete the survey in one sitting; you may save and exit the survey at any point and complete it at another time. Below are possible policies that the County would like to receive feedback on.

- **Policy #1: Commercial Building Energy Performance Benchmarking and Disclosure**
- **Policy #2: Commercial Building Energy Assessments/Retro-Commissioning**
- **Policy #3: Building Codes and Mandatory Upgrades**
- **Policy #4: Prescriptive Building Retrofit Requirements**
- **Policy #5: Commercial Property-Assessed Clean Energy (PACE) Financing**
- **Policy #6: On-Bill Financing (OBF)**
- **Policy #7: Green Leasing (Sustainability and Energy-Aligned Leasing)**
- **Policy #8: Green Building Tax Credit**
- **Policy #9: Rebate and Grant Programs**
- **Policy #10: Leadership Challenge/Strategic Energy Management**

Please click the “Next” button to read the first Policy.

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P10 **Policy #1: Commercial Building Energy Performance Benchmarking and Disclosure**

Overview: Development and disclosure of energy performance information would be required for buildings in the County with floor area 10,000 square feet or larger, including public buildings. The requirement to benchmark and report performance data would be implemented on a staggered schedule based on building size. The County and many other local governments are considering this requirement as a way to make energy use information visible in the market and thereby encourage wiser energy use and efficiency investments. Washington, DC; New York City, NY; Seattle, WA; and San Francisco, CA have all mandated energy performance benchmarking and disclosure policies.

Energy performance benchmarking employs a yardstick to measure a building’s energy performance, typically by tracking a building’s energy use per square foot. This number is then compared to that of similar buildings or to the building’s own performance over time. The County’s requirement would be

based on established performance scales created by the U.S. Environmental Protection Agency (EPA), and EPA's publicly-available tracking tool, Portfolio Manager.

While regulations would include more specifics, the proposed approach may include the following:

- A. Mandatory annual energy performance benchmarking of all buildings above a certain size
  - Buildings less than 10,000 square feet would be exempted.
  - Requirements would be phased in over several years; for example, buildings 100,000 square feet or larger would begin to benchmark as of April 1, 2014; 50,000 square feet or larger as of April 1, 2015; and 10,000 square feet or larger as of April 1, 2016.
  - Building owners would be required to use the Portfolio Manager software, a free tool developed by the EPA for this purpose and used for thousands of buildings.
- B. Mandatory annual disclosure of energy performance benchmarking data
  - Data would be posted on a publicly-viewable County website.
  - Data would not be disclosed for at least one calendar year after the policy takes effect.
  - Data would be available to real estate agents to include in listings.
  - Data would be available to prospective renters and buyers.
  - Penalties for non-compliance have not yet been established, and may depend on the level of voluntary compliance.

P11 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P12 More specifically...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. How do you feel about the benchmarking requirement of this policy (collecting and reporting the energy usage data)?	(5)	(4)	(3)	(2)	(1)
B. How do you feel about the public disclosure requirement of this policy?	(5)	(4)	(3)	(2)	(1)

P13 What impact would the following alternatives or changes have on your view of this policy?

	This would make me feel much more positive	This would make me feel somewhat more positive	This would not affect my view of this policy	This would make me feel somewhat more negative	This would make me feel much more negative	Not sure

A. Increasing the minimum threshold (square footage) to which the requirement applies	(5)	(4)	(3)	(2)	(1)	(9)
B. Exempting specific sectors or building types	(5)	(4)	(3)	(2)	(1)	(9)
C. Making benchmarking voluntary for buildings for an initial period (e.g., two years) then making it mandatory if a percentage (e.g., 25%) of buildings in the County do not participate	(5)	(4)	(3)	(2)	(1)	(9)
D. Providing incentives for owners that voluntarily benchmark to help them achieve higher scores	(5)	(4)	(3)	(2)	(1)	(9)
E. Making benchmarking transaction-based (rather than annual) and limiting disclosure to real estate professionals, prospective tenants or buyers involved in specific transactions	(5)	(4)	(3)	(2)	(1)	(9)

P15 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

//OPEN-END//

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**P20 Policy #2: Commercial Building Energy Assessments/Retro-Commissioning**

Overview: The proposed policy would require buildings with floor area 25,000 square feet or larger to conduct detailed facility energy efficiency assessments every five years, either as retro-commissioning projects (involving tuning up building systems to run optimally) or as energy assessments that identify a full range of efficiency measures and their costs and benefits. It may include alternatives such as training and certifying building operators to become more skilled in energy management.

Energy assessments (sometimes called energy audits) and retro-commissioning (RCx) projects are designed to identify energy savings opportunities across a full range of building components and systems (in the case of audits), or to diagnose and correct suboptimal performance in building energy systems (in the case of RCx). An energy assessment/audit might identify opportunities to upgrade lighting, heating, cooling, ventilation (HVAC), or control systems. An RCx project would typically test HVAC and controls systems, and make adjustments to optimize performance.

While final regulations would include more specifics, the proposed approach may include the following:

- Mandatory assessments or retro-commissioning of buildings above a certain size every five years
  - Buildings less than 25,000 square feet would be exempted.
  - Requirements would be phased in over several years; for example, buildings 100,000 square feet or larger would be required to undergo an audit or RCx as of April 1, 2014; 50,000 square feet or larger as of April 1, 2015; and 25,000 square feet or larger as of April 1, 2016.

P21 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P22 More specifically...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. How do you feel about the retro-commissioning component of this policy?	(5)	(4)	(3)	(2)	(1)
B. How do you feel about the energy audit/assessment component of this policy?	(5)	(4)	(3)	(2)	(1)

P23 What impact would the following alternatives or changes have on your view of this policy?

	This would make me feel much more positive	This would make me feel somewhat more positive	This would not affect my view of this policy	This would make me feel somewhat more negative	This would make me feel much more negative	Not sure
A. Increasing the minimum threshold (square footage) to which the requirements apply	(5)	(4)	(3)	(2)	(1)	(9)
B. Exempting specific sectors or building types	(5)	(4)	(3)	(2)	(1)	(9)
C. Extending the effective date/phase-in period	(5)	(4)	(3)	(2)	(1)	(9)
D. Exempting buildings if owners/managers demonstrate that such studies have been conducted within the last five years <u>and</u> that performance improvements of at least 10% have been documented through benchmarking data	(5)	(4)	(3)	(2)	(1)	(9)

E. Exempting buildings if they demonstrate that the subject building has achieved the ENERGY STAR building label, and is maintaining that label in subsequent years	(5)	(4)	(3)	(2)	(1)	(9)
F. Exempting buildings if management staff maintain a certification such as Certified Energy Manager or BOMI's Systems Management Technician designation	(5)	(4)	(3)	(2)	(1)	(9)

P25 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P30 **Policy #3: Building Code Upgrades**

Overview: The proposed policy would upgrade the County's building codes beyond the current requirements. It could increase stringency of energy efficiency requirements for basic energy components (such as roofs, walls, windows, lighting and HVAC systems) in new buildings, additions, and renovations. Codes also address the fundamental builder/buyer market barrier, where one of a builder's main motives is to keep construction costs low, and buyers' long-term interest is in reducing total ownership and operating costs, including energy costs.

Many jurisdictions offer both prescriptive and performance-based compliance paths. The prescriptive path specifies energy efficiency ratings for each component (e.g., wall insulation, windows). A performance-based path allows designers and builders to vary specific components as long as the total energy use of the building does not increase compared to a building that meets prescriptive requirements. Energy simulation models are typically used in compliance paths to calculate energy performance levels for various design choices.

P31 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

	This would make me feel much more positive	This would make me feel somewhat more positive	This would not affect my view of this policy	This would make me feel somewhat more negative	This would make me feel much more negative	Not sure
How would your view of this policy change if the County created performance-based compliance methods that give building owners more flexibility in meeting the requirements?	(5)	(4)	(3)	(2)	(1)	(9)

P35 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P40 **Policy #4: Prescriptive Building Retrofit Requirements**

Overview: The proposed policy would require that certain types of cost-effective energy efficiency improvements be implemented by a certain date or at defined points in the building lifecycle. This policy adds to the building codes approach by targeting specific, large efficiency opportunities that are frequently “lost” to market barriers.

Specific proposed policies include the following requirements:

- Replacement of inefficient outdoor lighting with high efficiency alternatives.
- For buildings with roof areas greater than 10,000 square feet, require “cool roofs” (heat-reflective roof coatings) or “green roofs” (using soil and vegetation) to be installed at the time of roof replacement.
- Installation of energy sub-metering on individual tenant units for residential properties with more than 50 dwelling units and commercial office properties over 10,000 square feet.
- Requiring that a building be compliant with current energy code requirements at the time of sale or ownership transfer.

It is anticipated that all mandates would be phased in over time. For example, the largest buildings or energy consumers would be included first, followed by smaller buildings or organizations. Some sectors where the economic barriers are extremely high could be exempted, deadlines extended, or incentives covering part of the costs provided.

P41 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P42 More specifically...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. How do you feel about requiring replacement of outdoor lighting with high efficiency alternatives?	(5)	(4)	(3)	(2)	(1)
B. How do you feel about requiring cool roofs or green roofs?	(5)	(4)	(3)	(2)	(1)
C. How do you feel about requiring installation of submetering?	(5)	(4)	(3)	(2)	(1)
D. How do you feel about requiring improvements to bring existing buildings up to code at time of sale or transfer?	(5)	(4)	(3)	(2)	(1)

P43 What impact would the following alternatives or changes have on your view of this policy?

	This would make me feel much more positive	This would make me feel somewhat more positive	This would not affect my view of this policy	This would make me feel somewhat more negative	This would make me feel much more negative	Not sure
A. Requiring replacement or installation on a set timeline (e.g., within 5 years) without incentives	(5)	(4)	(3)	(2)	(1)	(9)
B. Providing incentives for replacement for the first five years and then mandating specific alternatives thereafter	(5)	(4)	(3)	(2)	(1)	(9)
C. Exempting organizations that benchmark their energy performance and achieve a minimum score	(5)	(4)	(3)	(2)	(1)	(9)

D. Allow organizations to pay a “compliance fee” in lieu of adopting an action; the funds would be used to fund other community energy efficiency projects (e.g., incentives)	(5)	(4)	(3)	(2)	(1)	(9)
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P45 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P50 **Policy #5: Commercial Property-Assessed Clean Energy (PACE) Financing**

Overview: Property-Assessed Clean Energy (PACE) financing allows property owners to undertake energy efficiency and renewable energy projects through long-term, secured financing. A County PACE program would help property owners finance energy efficiency projects through loans repaid through County property tax bills over 10 to 20 years. PACE can thus be an effective way to reduce the significant barriers to financing energy efficiency and clean energy investments in commercial properties.

State authority for the County to set up a PACE program, under some circumstances, already exists under Maryland HB 1567, enacted in 2009. The County would create a legal mechanism known as a special tax assessment district, and would secure loan repayment obligations to property tax obligations. Capital could come from public or private sources, although the use of private third-party funds may require additional legal authority to enable the use of the County tax system to repay private loans. The County would also establish other necessary application, approval, oversight, and quality control methods. Property owners and their contractors would develop eligible projects, gain County approval, complete loan arrangements, and repay loans via property tax bills. Should an owner sell the property before the end of the loan term, the loan repayment obligation is transferred to subsequent owners until paid off.

P51 Based on what you’ve just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P52

	Definitely would	Probably would	Might or might not	Probably would not	Definitely would not

If you were to need financing for energy efficiency projects, how likely would you be to participate in a PACE program (assuming the financing terms were competitive)?	(5)	(4)	(3)	(2)	(1)
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P53 How appealing or unappealing do you find each of the following features of PACE?

	Very appealing	Somewhat appealing	Neutral	Somewhat unappealing	Very unappealing
A. Ability to pass retrofit costs on to tenants under a triple net lease (e.g., overcome the split incentive)	(5)	(4)	(3)	(2)	(1)
B. Ability to extend financing of capital-intensive improvements over a longer time horizon (e.g., 10 to 20 years)	(5)	(4)	(3)	(2)	(1)
C. Ability to transfer unpaid loan principal to subsequent owners of the property	(5)	(4)	(3)	(2)	(1)

P54 Based on what you've just read, how do you think PACE financing compares to a conventional loan? Would you say PACE financing is...

- 5 Much better than a conventional loan
- 4 Somewhat better than a conventional loan
- 3 About the same
- 2 Somewhat worse than a conventional loan
- 1 Much worse than a conventional loan

P55 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P60 **Policy #6: On-Bill Financing (OBF)**

Overview: On-bill financing (OBF) enables utility customers to repay loans for energy efficiency and renewable energy investments through their utility bills. While capital would likely come from third-party lenders, utilities would integrate loan repayments with their customer billing systems. The County would help customers make use of this option through education efforts, and may also help arrange for local lenders to participate in the effort. Most OBF programs provide relatively short-term financing, less than 10 years; however, the concept is not necessarily restricted to this loan tenure. By making financing more convenient, OBF can help overcome the barrier of lack of access to capital that inhibits many otherwise attractive efficiency investments.

OBF would likely require state legislation and/or Public Service Commission action to become available in the County. Legislation to this effect has been introduced in the current legislative session. The County would play a supporting role in helping establish OBF with the utilities serving the County and educating consumers about program options.

P61 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P62

	Definitely would	Probably would	Might or might not	Probably would not	Definitely would not
If you were to need financing for energy efficiency projects, how likely would you be to participate in an OBF program (assuming the financing terms were competitive)?	(5)	(4)	(3)	(2)	(1)

P63 How appealing or unappealing do you find each of the following features of OBF?

	Very appealing	Somewhat appealing	Neutral	Somewhat unappealing	Very unappealing
A. The fact that lower energy costs would offset bill increases resulting from loan payments	(5)	(4)	(3)	(2)	(1)
B. Ability to obtain financing with relatively simple underwriting standards	(5)	(4)	(3)	(2)	(1)
C. Ability to transfer unpaid principal to subsequent owners of the property	(5)	(4)	(3)	(2)	(1)

P64 Based on what you've just read, how do you think OBF compares to a conventional loan?  
Would you say OBF is...

- 5 Much better than a conventional loan
- 4 Somewhat better than a conventional loan
- 3 About the same
- 2 Somewhat worse than a conventional loan
- 1 Much worse than a conventional loan

P65 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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**P70 Policy #7: Green Leasing (Sustainability or Energy-Aligned Leasing)**

Overview: “Green leasing” (also known as sustainability or energy-aligned leasing) creates special terms in commercial and multifamily leases that pass through the cost of energy improvements as well as the associated energy savings. The goal is to structure financing and other aspects so that net lease payments are lower than they would be without the energy improvements.

Initially, the County would play a supporting role in helping establish voluntary green leasing practices. It would work with stakeholders to develop model documents and associated practices, which could then be adopted by the real estate community. The County would also make best efforts to require green lease options for public facilities.

P71 Based on what you’ve just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P72

	Definitely would	Probably would	Might or might not	Probably would not	Definitely would not	Not Applicable
How willing would you be to adopt a green lease, either as a building owner/manager or as a tenant?	(5)	(4)	(3)	(2)	(1)	(9)

P74 Based on what you’ve just read, how do you think green leasing compares to a conventional lease? Would you say green leasing is...

Much better than a conventional lease  
Somewhat better than a conventional lease  
About the same  
Somewhat worse than a conventional lease  
Much worse than a conventional lease

P75 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P80 **Policy #8: Green Building Tax Credit**

Overview: In 2006, the County instituted a property tax credit for commercial buildings that meet defined green building standards. While this credit is often seen as applying to new construction, it also applies to existing buildings under certain conditions. The proposed policy would identify new ways to use this approach to encourage both new and existing buildings to become more energy-efficient. The tax credit currently starts at 10% of property taxes for the minimum LEED Silver certification level, and rises as high as 75% for certain building types that meet LEED's highest, or Platinum, level. Options for modifying the tax credit program going forward are outlined below.

- **Modifying credit percentages:** offer credits based on higher percentages of tax amounts due for buildings meeting the criteria.
- **Modifying eligibility levels:** make it easier to qualify based on setting technical criteria thresholds.
- **Adding specific energy performance requirements:** LEED doesn't currently require a specific level of energy performance. To meet County policy goals, specific energy performance levels could be added on to LEED criteria.

P87 Before taking this survey, were you aware that Montgomery County, MD offered a Green Building Tax Credit?

Yes, **and** we have received this tax credit in the past  
Yes, but we have never received this tax credit  
No, I was not aware of this tax credit

P81 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P82 More specifically, how do you feel about...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. Increasing credit percentages	(5)	(4)	(3)	(2)	(1)
B. Modifying eligibility levels	(5)	(4)	(3)	(2)	(1)
C. Adding specific energy performance requirements	(5)	(4)	(3)	(2)	(1)

P85 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P90 **Policy #9: Rebate and Grant Programs**

Overview: Utilities such as Pepco have offered commercial customer energy efficiency incentives in recent years, and based on a recent order from the state Public Service Commission (PSC), new utility programs are likely to be offered. The County is looking to help shape these programs for the maximum benefit of County building owners, and to help promote the use of these programs. In addition, the proposed policy may expand County-level incentives in concert with utility incentives to accelerate adoption of energy efficient practices. Stakeholder feedback in this area will help the County set its priorities.

Additional rebates might be targeted to the following:

- Increasing use of technologies that are not eligible for utility incentives
- Achieving a significantly higher efficiency level than required for the utility rebate
- Increasing incentives to hard-to-reach sectors (e.g., small business, multi-family)
- Spurring development of local economic development linked to the deployment of efficient technologies

It is important to note that any incentive program requires a funding source. Sources could include the following:

- Increasing the County's Energy Tax rate
- Diverting Energy Tax Revenues from other uses
- Finding other County revenue sources
- Applying non-compliance or alternative compliance payments from County energy policies (e.g., if a building owner failed to submit benchmarking data, they may be subject to penalties, which could be used for other energy program purposes)

P91 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P92 More specifically, how do you feel about...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. The adequacy of current utility incentives	(5)	(4)	(3)	(2)	(1)
B. The ability of current utility programs to support your energy efficiency goals	(5)	(4)	(3)	(2)	(1)

C. Supplemental County rebates for improvements not covered by existing utility programs	(5)	(4)	(3)	(2)	(1)
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P93 What impact would the following alternatives or changes have on your view of this policy?

	This would make me feel much more positive	This would make me feel somewhat more positive	This would not affect my view of this policy	This would make me feel somewhat more negative	This would make me feel much more negative	Not sure
A. Increasing rebate amounts for currently eligible efficiency measures	(5)	(4)	(3)	(2)	(1)	(9)
B. Making more kinds of efficiency measures eligible for rebates	(5)	(4)	(3)	(2)	(1)	(9)

P94 How do you feel about the following ways the County could obtain funding to pay for energy incentives?

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. Increasing the County's energy tax rate	(5)	(4)	(3)	(2)	(1)
B. Redirecting existing energy tax revenues from other County budget priorities	(5)	(4)	(3)	(2)	(1)
C. Finding new revenues from other county sources	(5)	(4)	(3)	(2)	(1)
D. Non-compliance fees or alternative compliance payments for buildings that do not comply with other County energy policies	(5)	(4)	(3)	(2)	(1)

P95 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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P100 **Policy #10: Leadership Challenge/Strategic Energy Management**

Overview: This policy would create a voluntary challenge initiative, inviting property owners and occupants to commit to long-term energy savings targets and to creating energy management programs in their organizations to support and measure progress toward reaching those targets. The Challenge would be connected to a County benchmarking policy in which building energy performance is measured and disclosed; in such a scenario, the benchmarking system could become a platform for

measuring progress toward voluntary targets. The challenge may also include energy service and product providers and financing organizations to expand options for improvements to buildings, similar to the federal Better Buildings Initiative. Such efforts are underway in cities like Louisville, KY; Denver, CO; and Charlotte, NC.

While details are yet to be determined, a County initiative in this area would likely include the following:

- A challenge issued by County leaders to building owners to commit to a ten-year energy savings target, likely to be in the range of 25% consistent with the Climate Action Plan's goal for the commercial building sector
- Linkage to the County's energy performance benchmarking system, so that building owners could use a common platform to report progress toward their targets
- Technical assistance in educating building owners and managers about the program, about setting up a strategic energy management program, and about the software tools and other aspects of the program
- Tools and resources (e.g., sample campaign styles, tools, messages) to assist in behavior change campaigns in buildings
- Peer-to-peer information exchange
- Recognition for organizations that commit to the effort, and for those that achieve the most substantial results
- Providing preferential incentives (e.g., rebates) to organizations that commit to reduction targets or achieve high levels of performance

P101 Based on what you've just read...

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
How do you feel about this policy <u>overall</u> ?	(5)	(4)	(3)	(2)	(1)

P103 How do you feel about the following aspects of this policy?

	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
A. The County Executive would invite businesses and organizations to accept this challenge, including a specific savings goal	(5)	(4)	(3)	(2)	(1)
B. The fact that participation would be voluntary	(5)	(4)	(3)	(2)	(1)
C. Committing to a specific energy savings target	(5)	(4)	(3)	(2)	(1)
D. Measuring performance against the target using benchmarking software	(5)	(4)	(3)	(2)	(1)
E. Engaging people across my organization to achieve savings	(5)	(4)	(3)	(2)	(1)

F. Getting public recognition for our voluntary achievements	(5)	(4)	(3)	(2)	(1)
G. Getting technical assistance, tools, and resources from the County	(5)	(4)	(3)	(2)	(1)
H. Preferential incentives, such as rebates, available only to challenge participants	(5)	(4)	(3)	(2)	(1)

P107 Do you participate in challenges in other communities?

Yes (please specify community): \_\_\_\_\_

No

P105 Please use the space below to elaborate on any of your answers above or to provide additional comments, concerns, or suggestions on this policy recommendation.

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Q14: If you have any other feedback you would like to share with the County about energy efficiency programs, please enter it below.

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Q15 Do you have any interest in participating in an interview, focus group, or other communication to help shape potential policies that could result from this study?

Yes

No

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//ASK IF Q15=Yes//

Q15A Please enter your contact information below.

Contact Name: \_\_\_\_\_

Contact Email: \_\_\_\_\_

Contact Telephone: \_\_\_\_\_

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CLOSING PAGE

Thank you very much for sharing your opinions with the County!

To finish, please click "Submit Survey" below. Note that once you submit your survey, you will not be able to review/change your previous responses.

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END PAGE (Shown after survey is submitted)

Thank you for completing this survey!

The Montgomery County Department of Environmental Protection greatly appreciates your assistance with this first phase of its study. If you indicated an interest in being contacted for interviews or focus groups, you may hear from County staff or the County's consultant, ICF International.

Later this year, you will have the opportunity to review a draft of the report on this project, submit written comments, and attend a public forum and webinar.

If you have any questions about the next steps in this study, please contact Eric R. Coffman, Senior Energy Planner in DEP, at 240-777-7754 or [eric.coffman@montgomerycountymd.gov](mailto:eric.coffman@montgomerycountymd.gov).

## 6.3 Appendix C: Summary of Comments

**Name:** Colin Shay, Director, Business Development and Sustainability

**Organization:** Washington Gas

**Comments:**

### **Montgomery County Maryland Building Energy Efficiency Policy Study**

Montgomery County is to be commended in its efforts to address energy efficiency and environmental concerns at the county level. It is through these localized efforts, coupled with the right policies at the state and federal level, that Montgomery County, the state of Maryland, and the Country can achieve its energy and environmental objectives. Washington Gas appreciates the opportunity to participate and to provide comments in this important endeavor.

However, we are concerned that, by developing policies and strategies on energy use and its impact on the environment without including the total fuel cycle approach, the County will fail in its efforts to reach its own stated objectives of reducing air pollutants and greenhouse gas emissions and of reducing energy bills. In doing so, Montgomery County is choosing not to follow the advice of the National Academies and the U.S. Department of Energy.

The total fuel cycle approach allows all sources of energy, fossil fuels and renewables, to be placed on a level playing field for equal consideration. Without including the total fuel cycle, the policy and its resulting strategies will exclude 60% of the energy consumed in the County for electricity use and its resulting environmental emissions. Without including the total fuel cycle, the policy and its resulting strategies will also result in the wrong energy decisions being made. This type of basis for a policy will result in the citizens of Montgomery County having fewer, not greater, choices of energy sources.

Montgomery County has the opportunity to put the right policies and strategies into place to become a leading jurisdiction in the energy and environmental field. Through our involvement in this process, we remain supportive of the efforts of the County and will work with the developers of this policy so that Montgomery County can achieve the energy and environmental goals it has for its citizens.

**Name:** Alan Abrams

**Organization:** Abrams Design Build LLC

**Comments:**

I am writing as a citizen of Silver Spring, a business owner of Takoma Park, a builder licensed in Montgomery County, and most importantly, a member of the Mid Atlantic Passive House Alliance. MAPHA, a regional chapter of the Passive House Alliance of the United States, is a building industry oriented organization devoted to promoting the energy efficient design and construction of homes and other buildings.

As a building contractor who works in the field of residential remodeling, I am nearly always involved in projects that include improvements to homes to reduce energy use for heating and cooling. One strategy for accomplishing this objective is to add layers of insulation to the exterior walls of the building. However, the majority of homes--particularly in the down-county vintage neighborhoods that constitutes my "territory"--are built spot on the front yard setback of the property. Often, one or both sidewalls are on the side yard setbacks as well.

The point of all this is, that in such cases, existing zoning regulations preclude adding layers of insulation and cladding to the face of buildings. The variance process, which is based on relief from unusual lot conditions, and which requires proof of hardship, does not contemplate this methodology.

Given Montgomery County's objective of reducing greenhouse gas emissions by 80%--which is acknowledged in the County's Climate Protection Plan to be "a daunting challenge"--I think it would be in the interest of the County and its citizens ***to revise the current zoning code to permit limited projections over setbacks for the purpose of adding insulation to the walls of buildings.*** Indeed, changes to zoning regulations are anticipated in the Climate Protection Plan (LUP-2, page ES-9).

Zoning regulations already permit limited projections over setbacks for roof overhangs and belt courses, so a change of this nature is well within the spirit and practice of the code. A six inch projection would give a builder the capability of transforming, for example, the uninsulated masonry wall of a WWII era home, from a frigid R-2 to a warm and cozy R-26, using four inches of foam insulation with two inches of furring and siding.

All at no cost to the County.

**Name:** Jim McDonnell, Bethesda, Maryland

**Comments:**

*Energy Efficiency* - Rather than focusing on an absolute 25% commercial energy use reduction goal over ten years, perhaps the study team could explore and possibly recommend that the County's goal be modified to target an overall reduction in the County's energy intensity, adjusted for the level of economic activity. This could be measured and tracked by dividing total County energy usage in British Thermal Units (Btu) by gross County economic activity (\$). This would place the focus on improving overall energy efficiency while, at the same time, not acting to limit economic growth in the County.

*Peak demand* - Given that peak demand is what drives the amount of electricity generation capacity needed to supply electricity to businesses (and residences) of Montgomery County, and given that generation called upon to supply peak demand is often less environmentally friendly, should the County consider a peak demand reduction goal (kW versus kWh), again adjusted for the level of economic activity in the County?

*Impact on economic activity* - The study notes that the County's energy usage reduction goals may be achievable only in a low economic growth scenario (along with aggressive new energy codes). In the project team's opinion, are the County's goals unrealistic? What would be the impact of the energy usage reduction goal on economic activity?

*Cost/benefit* – The study team indicates that cost effectiveness was not a first priority (or the primary criterion) of this study, but, rather, technical feasibility was. Given the conclusion that funds will have to come from somewhere to support the level of energy efficiency desired by the county, how will those funds be directed without a cost/benefit analysis? Even without new funds, what are the costs that will be imposed on county owners of commercial and multi-family properties as a result of the proposed recommendations? What would be the second order implications of those additional costs on economic activity in the county?

*How are we doing now?* - How does Montgomery County's commercial energy usage baseline compare to national averages or to that of other US major metropolitan, suburban counties? Are we starting from a position of leadership, are we about average, or are we below average?

*Price projections* – Given the dramatic decline in energy prices since 2008, consideration should be given to presenting the summary economics under a continued low energy price scenario.

*More study* - Will the detailed data behind the study be made available to residents who may wish to use it to conduct their own analyses?

**Name:** Frann G. Francis, Esq., Senior Vice President and General Counsel

**Organization:** Apartment and Office Building Association of Metropolitan Washington

**Comments:**

Dear Mr. Coffman:

The Apartment and Office Building Association of Metropolitan Washington (“AOBA”) files these comments in response to the August 22, 2012 draft Montgomery County, Maryland Commercial Building Energy Efficiency Policy Study (“Study”). AOBA’s members own and manage 244,000 apartment units and 170 million square feet of commercial property in the Washington metropolitan area; of that total, roughly 70,000 apartment units and 20 million square feet of office space are in Montgomery County.

Energy efficiency, conservation, and reduction in energy demand are key components of efforts to responsibly manage commercial and multifamily properties throughout the region, and AOBA members independently pursue creative measures to do so.

AOBA believes that voluntary measures undertaken by building owners and managers have and will continue to drive greater energy efficiency, conservation and reduced demand and consumption. Our members continue to retrofit existing properties and construct new buildings utilizing best practices in design, materials, systems and management that have led to US Green Building Council - Leadership in Energy and Environmental Design (USGBC-LEED) certifications of their properties across the region. As USGBC has stated, “LEED certification provides independent, third-party verification that a building, home or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.”

AOBA supports several recommendations in the Study. We support local, state and federal tax incentives which provide critically important, yet easily implemented, measures that will lead to greater energy efficiency, conservation, and demand and consumption reduction, through retrofitted and new buildings that meet the highest industry code and performance standards for energy efficiency. Tax incentives not only stimulate the development of more energy efficient buildings, but they also provide economic development with additional jobs and vendor opportunities. This leads to a broadening of the local tax base which, in turn, provides increased revenues for schools, infrastructure improvements and other governmental purposes. The competitiveness of the local economy improves, while taxes on residents and commercial businesses stabilize.

The EmPower Maryland energy efficiency program, operated by Pepco and other Maryland electric utility companies, has proven to be an effective stimulus in generating the type of public/private partnership that promotes successful energy efficiency, conservation and reduced demand for energy. Since its inception in 2009, AOBA has worked in partnership with Pepco and its program manager, Lockheed Martin, to inform and educate our members about the benefits of Pepco’s commercial and multifamily program offerings. Our members have aggressively pursued Pepco’s incentives, which has led to new construction and retrofits that

have resulted in improved energy efficiency in these buildings and, thus, significant reductions in energy consumption and demand.

AOBA's members, particularly those who are multifamily property owners, would benefit from greater flexibility in the Empower Maryland program; for instance, to permit incentives for replacing appliances and HVAC systems in individually metered units, in addition to infrastructure improvements. AOBA continues to work with Pepco on the development of program options and incentives that will increase the opportunity for Maryland to exceed current energy efficiency, conservation, and demand reduction goals. Similarly, in Northern Virginia, AOBA and its members have partnered with Dominion Virginia Power in efforts to use incentives to augment our industries' proactive construction, operations, and management efforts aimed at increasing energy efficiency.

We believe that the flexibility of the financial or tax incentive, regulation, or other programs being offered will form a critical part of the ultimate value of any public/private partnership efforts. Flexibility is often necessary to expedite completion of projects and thereby ensure that the energy efficiency, conservation and demand reductions benefits are accelerated and realized contemporaneously with private investments.

AOBA cautions, however, against over-regulation. While regulatory efforts are often well-meaning, the law of unintended consequences applies when the resulting impact of regulations is burdensome and the costs of implementation can exceed anticipated benefits. Such results lead to economic stagnation, reduced competitiveness, fewer jobs, higher residential and commercial taxes, and a reputation that the governmental entity is inflexible, unfriendly to business and not conducive to innovation. Under such circumstances, existing local businesses may choose to relocate, businesses from outside the jurisdiction will be less interested in relocating there, and other local, state, and foreign governments offering incentives and a more reasonable regulatory climate will be advantaged in the competition for businesses. If permitted, these events have a cumulative, substantial negative impact on the health of the jurisdiction's local economy, its supporting tax base and ability to finance government programs, the availability of investment capital, and the cultural and educational environment of the community. When economic decline occurs, the years required for a revitalized economy to emerge are directly affected by the extent of the regulatory burdens and constraints created by local governments.

AOBA and its members have every reason to believe that Montgomery County has no intentions to harm the economy or to adopt into law impediments to the continued economic revitalization of an economy still in recovery from the worst financial conditions since the Great Depression. As both government and the private sector know all too well, a healthy financial climate must exist for a robust economy to endure. The confidence of financial markets and institutions in lending and investment is as sensitive as the ecosystem we all seek to preserve and enhance through energy efficiency, conservation and reduction in energy demand. We must all manage our expectations regarding the goals and objectives of public policy with the reality that financial markets and institutions either expand or contract the availability of capital, rightly or wrongly, depending on the government mandate(s) at issue. The ongoing credit crisis, affecting government, individual and business access to capital, is a perfect example. AOBA's perspective is not one of doom and gloom, but an outlook on what propels enduring prosperity that benefits all residents and businesses in Montgomery County. Those residents and businesses

that choose to relocate to the County will do so because of its realistic and innovative approach to governing in the public interest. Our economic prosperity depends upon such commitments.

A well-balanced combination of tax incentives, flexibility in government programs, and entrepreneurial spirit will do more to achieve our shared interests in economic prosperity, energy efficiency, conservation and reductions in energy consumption than complex and unyielding regulations. Historically, costly, inflexible and unproductive government mandates have only siphoned investment confidence out of businesses which are needed to propel every great economy. Our shared interest in a strong economy, shouldered by a diversified tax base, with a public/private partnership ready and able to compete for new business, cultural, and educational opportunities anywhere in the world, is important to AOBA and its members. Our members' businesses depend on, and benefit from, a thriving economic environment. Public policy goals of achieving sustainable energy efficiency, conservation and demand reduction are significant components of Montgomery County's recovering economy. We look forward to working with all interested parties to move forward with sensible energy efficiency public policy initiatives, not only for commercial and multifamily property owners, but for all consumers of energy, now and into the future. Our shared economic prosperity depends upon our public/private partnership succeeding.

Sincerely,

Frann G. Francis, Esq.

Senior Vice President and General Counsel

**Name:** Joyce Siegel

**Organization:** N/A

**Comments:**

My comments/ideas: (all re multi family)

1)...to get more "bang for the buck:" ..I'd segregate older from newer buildings of a certain year (which I don't now) but the newer buildings will generally have more energy efficiency components (appliances, windows for example) and older buildings in general are less energy efficient so I'd focus on older buildings (pg 16?)

2) Train management companies/ managers...even require it for licensing? 2a) Require licensing of managers.

3) look at what California, Colorado and Mass. are doing

4) prioritize the cheap and easy

5) provide ball park cost benefit projections to buildings for energy efficiency improvements...r.o.i.projections...help buildings determine priorities

6) publicize successes....case studies

7) provide technical assistance...an energy efficiency one stop shop

8) help assemble low cost financing

9) identify qualified contractors

10. County seal of approval?...like good housekeeping...energy efficiency more attractive to buyers

11) maybe require an energy efficiency grade in real estate documents....???

**12)Important.... develop some kind of incentives for property owners of non master metered rentals to increase energy efficiency..if utilities aren't included in rent and resident is paying there's no incentive to the owner to care**

13) rewards for successes???